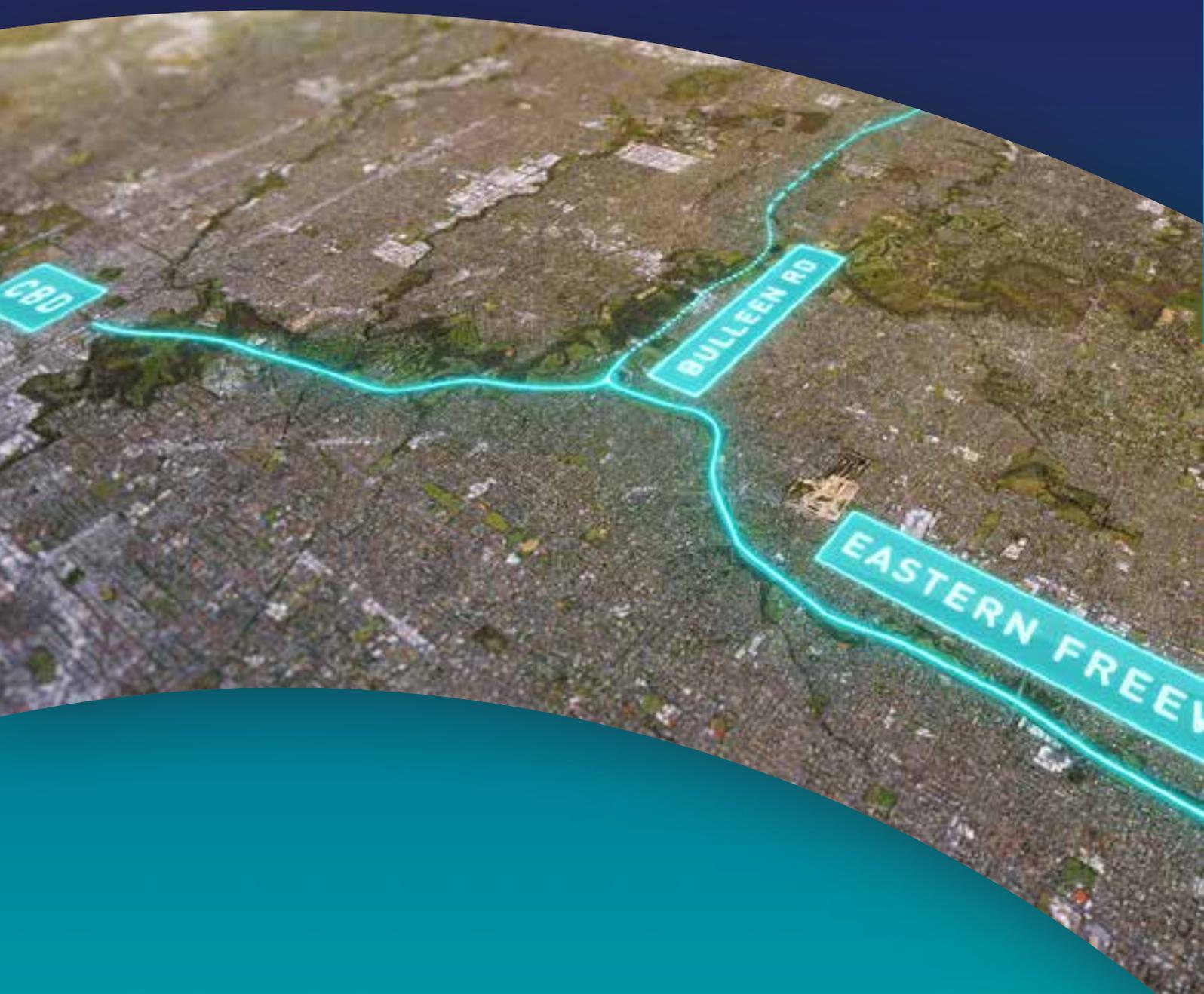


Environment
Effects Statement

Attachment III Risk report



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Attachment III

Risk report

Executive Summary

This report is an attachment to the North East Link Environment Effects Statement (EES). It has been used to inform the EES required for the project. This report describes this risk assessment process used to inform the EES.

North East Link ('the project') is a proposed new freeway standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include works along the Eastern Freeway from near Hoddle Street to Springvale Road.

Under section 3 of the *Environment Effects Act 1978*, an Environment Effects Statement must be prepared for the project. The EES allows stakeholders to understand the likely environmental impacts of North East Link and how they are proposed to be managed.

The *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Department of Sustainability and Environment 2006) require use of a systems and risk-based approach to assess environmental effects. The scoping requirements also require the EES approach to be risk-based so that 'a greater level of effort is directed at investigating and addressing those matters that pose relatively higher risk of adverse effects'.

Risk assessment has formed part of the North East Link EES assessment framework. It has enabled differentiation of significant and high risks and impacts from lower risks and impacts and informed priorities for impact assessment.

The EES assessment differentiates between risks and impacts as follows:

- A risk is the function of the likelihood of an adverse event occurring and the potential consequences of the event
- An impact relates to the outcome of an event (planned or unplanned) in relation to an asset, value or use being realised.

The risk assessment was carried out in general accordance with the risk process guidance outlined in the section 5 of the Australian Standard AS/NZS ISO 31000:2009, Risk management – Principles and guidelines. The risk assessment process and risk criteria were tailored for the EES and North East Link's context.

The results of the risk assessment have helped to focus the impact assessment and informed development of the reference project and measures to avoid, mitigate and manage of environmental risks and impacts. Environmental Performance Requirements (EPRs) were refined in response to the risk assessment. The EPRs set the minimum outcomes necessary to avoid, mitigate or manage environmental impacts during delivery of the project and would be complied with during delivery of North East Link.

A range of risk pathways were identified and assessed by specialists during the EES process. The initial risk assessment rated these risk pathways as planned, very low, low, medium, high or very high. The initial risk assessment assisted to focus the impact assessment on areas of medium or higher risks and planned events. Where risks were rated as medium or above or were planned events with a consequence of minor or above, additional risk treatment options such as design refinements and new or revised EPRs were considered. In addition, many of the EPRs were revised during the course of the EES risk and impact assessment process to reflect project-specific risks and impacts.

Following risk treatment most risks were identified as either very low, low or medium risks. No risks were identified as having a high or very high residual risk. Planned events had consequence ratings ranging from negligible through to major and were assessed further through the impact assessment process.

Residual risks rated as medium and planned events relate to a range of disciplines including Aboriginal cultural heritage, arboriculture, air quality, businesses, ecology, historical heritage, human health, ground movement, land use planning, landscape and visual impacts, social, surface water, and traffic and transport. These would be managed by the EPRs and associated management plans where required to manage the risks and mitigate planned and potential impacts.

1 Introduction

1.1 Overview

North East Link ('the project') is a proposed new freeway standard road connection that would complete the missing link in Melbourne's ring road, giving the city a fully completed orbital connection for the first time. North East Link would connect the M80 Ring Road (otherwise known as the Metropolitan Ring Road) to the Eastern Freeway, and include works along the Eastern Freeway from near Hoddle Street to Springvale Road.

On 2 February 2018, the Victorian Minister for Planning issued a decision confirming that an Environment Effects Statement (EES) is required for the project due to the potential for significant environmental effects.

The *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (Department of Sustainability and Environment 2006) and the EES scoping requirements issued by the Minister for Planning for North East Link require use of a risk based approach to assess environmental effects. This report describes the risk assessment process carried out for the North East Link EES.

1.2 Risk assessment approach

Environmental risks and impacts are a key consideration for the planning and delivery of North East Link. Environmental issues have been a key factor in decision-making from initial identification of North East Link as a strategic option to provide better transport connections between the north, east and south-east of Melbourne through to development of the reference project assessed in this EES. This process is described in Chapter 6 – Project development.

A preliminary screening analysis of environmental risk was undertaken during the concept design phase to identify the potential for the project to impact assets, values and uses and prioritise issues for further investigation. This screening analysis considered the concept design, findings of preliminary scoping investigations, discussions with key stakeholders, early engagement with the community and relevant legislation, policy and guidelines.

What is a risk?

AS/NZS ISO 31000:2009 Risk management – Principles and guidelines defines risk as the: *effect of uncertainty on objectives*.

Risks are usually described in terms of the risk source or activity, potential events, and their consequences and likelihood.

The EES assessment differentiates between risks and impacts as follows:

- A risk is the function of the likelihood of an adverse event occurring and the potential consequences of the event
- An impact relates to the outcome of an event (planned or unplanned) in relation to an asset, value or use being realised.

This EES risk assessment builds on the preliminary screening analysis to form a key component of the EES assessment framework. The EES risk assessment has iteratively informed and been informed by the:

- Reference project presented in this EES
- Existing conditions and impact assessments presented in the EES technical reports
- Environmental Performance Requirements (EPRs).

This process has been informed by engagement with key internal and external stakeholders including the community, agencies, and regulators.

EPRs set the minimum environmental outcomes that must be achieved for the design, construction and operation of North East Link, regardless of the design solution delivered. Chapter 27 – Environmental management framework describes the framework for implementing and confirming compliance with EPRs.

Chapter 4 – EES assessment framework describes this process in more detail.

1.3 Risk assessment scope and objectives

The EES risk assessment considered risks to the environment that may arise from the construction and operation of North East Link. Risks were assessed across 18 specialist areas:

- Aboriginal cultural heritage
- Air quality
- Arboriculture
- Business
- Contamination and soil
- Ecology
- Greenhouse gas
- Ground movement
- Groundwater
- Historical heritage
- Human health
- Land use planning
- Landscape and visual
- Social
- Surface noise and vibration
- Surface water
- Traffic and transport
- Tunnel vibration.

Project benefits were not considered as part of the risk assessment. However, these have been discussed in the EES and in relevant technical reports as part of the impact assessment.

The objective of the EES risk assessment was to identify environmental risks associated with the construction and operation of the North East Link reference project and to develop measures to reduce these risks where practicable and appropriate. Specifically the EES risk assessment aimed to:

- Systematically identify the interactions between project elements and activities and assets, values and uses
- Focus the impact assessment and enable differentiation of significant and high risks and impacts from lower risks and impacts
- Inform development of the reference project to avoid, mitigate and manage environmental impacts
- Inform development of EPRs that set the minimum outcomes necessary to avoid, mitigate or manage environmental impacts and reduce environmental risks during delivery of the project.

2 Risk context

2.1 Overview

North East Link would traverse Melbourne's north-eastern suburbs. The project is set within the municipalities of Banyule, Boroondara, Nillumbik, Manningham, Whitehorse, Whittlesea and Yarra. Land uses around North East Link are highly varied and include residential, open space, commercial, industrial and retail. There are a number of sporting facilities and areas of active open space including golf courses, sporting clubs and ovals and reserves.

While the area has undergone significant urbanisation, areas of relatively high ecological value and potential heritage value remain, particularly around the Yarra River floodplain. This area includes the Banyule Swamp and Bolin Bolin Billabong as well as multi-use recreational parks and the Heide Museum of Modern Art. The project is predominantly set within the Yarra River catchment, and intersects with sections of the Yarra River, Merri Creek, Plenty River, Koonung Creek and Banyule Creek.

Works for North East Link would also vary in nature ranging from the establishment of a new freeway connection including surface and tunnelled sections, to the widening of the existing Eastern Freeway.

As such, the nature of environmental risks that may occur on North East Link are varied, requiring a risk assessment method and criteria that are sufficiently flexible to enable a wide range of risks to be identified, assessed and consistently rated.

This section provides a brief description of key elements of the North East Link context that have informed the EES risk assessment method.

2.2 North East Link description

The North East Link alignment and its key elements assessed in the EES risk assessment include:

- **M80 Ring Road to northern portal** – from the M80 Ring Road at Plenty Road, and the Greensborough Bypass at Plenty River Drive, North East Link would extend to the northern portal near Blamey Road utilising a mixture of above, below and at surface road sections. This would include new road interchanges at M80 Ring Road and Grimshaw Street.
- **Northern portal to southern portal** – from the northern portal the road would transition into twin tunnels that would connect to Lower Plenty Road via a new interchange, before travelling under residential areas, Banyule Flats and the Yarra River to a new interchange at Manningham Road. The tunnels would then continue to the southern portal located south of the Veneto Club.

- Eastern Freeway** – from around Hoddle Street in the west through to Springvale Road in the east, modifications to the Eastern Freeway would include widening to accommodate future traffic volumes and new dedicated bus lanes for the Doncaster Busway. There would also be a new interchange at Bulleen Road to connect North East Link to the Eastern Freeway.

These areas are illustrated in Figure III-1.

The project would also improve existing bus services from Doncaster Road to Hoddle Street with the Doncaster Busway as well as pedestrian connections and the bicycle network with connected shared use paths from the M80 Ring Road to the Eastern Freeway.

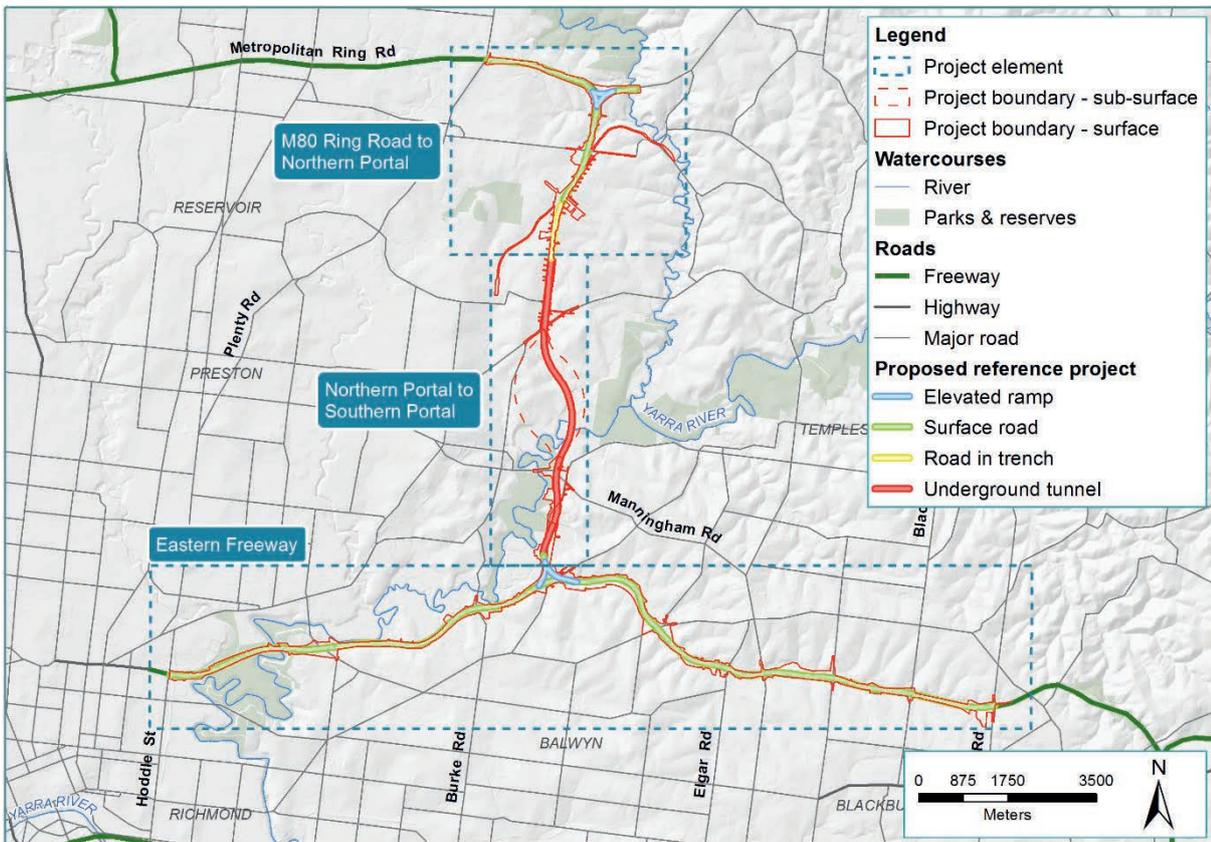


Figure III-1 Overview of North East Link

For a detailed description of North East Link and the construction and operation activities considered in the EES risk assessment, refer to EES Chapter 8 – Project description.

2.3 Environmental setting

Key elements of the environmental setting and key issues requiring assessment are summarised in Table III-1.

Table III-1 Summary of environmental setting

Discipline	Context and key issues
Traffic and transport	The transport network in the north-eastern suburbs contains freeways and arterial roads, the metropolitan bus network and metropolitan train and tram networks. Existing roads such as Greensborough Road and Rosanna Road currently carry significant amounts of traffic travelling north to south east. Potential risks and impacts requiring assessment include impacts to transport functionality including on motor vehicle traffic, freight, public transport, walking and cycling during the construction and operation of North East Link.
Air quality	Existing air quality in the vicinity of North East Link is typical of urban Melbourne. It is primarily influenced by emissions from industry, transport, domestic fuel burning and residential activities. Air pollutants relevant to the assessment of North East Link during construction and operation are largely the components of exhaust emissions from vehicles and machinery. Potential risks and impacts requiring assessment include impacts to ambient air quality associated with surface roads and tunnel operation and at sensitive receptors due to dust associated with the construction and vehicle emissions during the operation of North East Link.
Surface noise and vibration	The existing noise and vibration environment in the vicinity of North East Link is typical of urban Melbourne and influenced by the M80 Ring Road, Eastern Freeway and arterial roads such as Greensborough Road. Sensitive receivers were identified including noise sensitive residential and community buildings and outdoor recreation and public open spaces. Other receivers such as commercial land and industrial land were also identified. Potential risks and impacts requiring assessment include changes to noise and vibration levels due to plant and machinery during construction, traffic during construction and operation, and stationary plant such as ventilation structures during the operation of North East Link.
Tunnel vibration	North East Link would include approximately six kilometres of twin tunnel passing under the Yarra River. Background vibration monitoring was carried out and found that the vibration conditions in the vicinity of the proposed North East Link tunnels are typical of quiet residential areas, with minimal sources of vibration. Potential risks and impacts requiring assessment include vibration and regenerated noise levels at residential and commercial buildings, and other utility infrastructure during the construction and operation of North East Link.
Land use planning	North East Link is proposed to be located in developed areas of north east Melbourne. Land use surrounding North East Link comprises a mixture of residential, open space, commercial, industrial and retail. Potential risks and impacts requiring assessment include impacts to the continuation of existing land uses and built form character, including residential, commercial, industrial and recreational values. This includes an assessment of impacts that are inconsistent with existing Victorian and local government plans, strategies or policies.

Discipline	Context and key issues
Business	<p>The north-eastern region is characterised by small businesses servicing the local and adjacent metropolitan areas. Major business types include retail trade, other services, construction businesses, arts and recreation services including sporting and health clubs, and education and training providers. Potential risks and impacts requiring assessment include impacts on businesses (and interdependent businesses) in the immediate vicinity of the project, due to acquisition, access changes, visual impact, noise and vibration and air pollution during construction and operation of North East Link.</p>
Arboriculture	<p>The tree and urban forest character around the project alignment consists of planted indigenous, Victorian native and Australian native trees, with relatively few exotic trees. Potential risks and impacts requiring assessment include impacts on planted trees and associated canopy cover during construction of North East Link.</p>
Landscape and visual	<p>North East Link would pass through three overarching landscape character areas defined by geology, topography, waterways, vegetation cover and land use. These have been broadly described as the Ridgeline, Yarra River valley and Koonung Creek valley character areas. Potential risks and impacts requiring assessment include changes to landscape and view lines from public and private locations during the construction and operation of North East Link.</p>
Social	<p>North East Link would be located within a well-established and urbanised area in the north-east of the Melbourne metropolitan region, characterised by residential areas, open spaces, commercial and industrial land uses. As North East Link would largely be located along existing road corridors, common concerns among communities include existing traffic congestion along arterial roads which create barriers to community connectivity particularly during peak times. Potential risks and impacts requiring assessment include impacts from the construction and operation of North East Link on social amenity and access to community facilities including temporary and permanent displacement of residents and accessibility to recreational areas, local businesses and community facilities.</p>
Human health	<p>North East Link would be constructed and operated within a highly urbanised area that includes long-established and diverse neighbourhoods and communities. Health data evaluated in the EES for the local government areas of Banyule, Boroondara, Manningham, Nillumbik, Whitehorse and Yarra is statistically similar to that reported for Victoria. The predicted changes to noise and vibration and air quality and the social changes that are anticipated as a result of the project have the potential to influence the health and wellbeing of the community. Potential risks and impacts requiring assessment include potential risks to human health due to changes to air quality, noise, traffic and social and community changes during the construction and operation of North East Link.</p>
Historical heritage	<p>Heritage places identified in the vicinity of North East Link include the Yarra River and environs and the Victorian Heritage Register places of Banyule Homestead, Heide I, Heide II and the Former Fairlea Women’s Prison. Other places listed on the Victorian Heritage Inventory and planning scheme heritage overlays were also identified. Potential risks and impacts requiring assessment include impacts to historical heritage values due to vibration and subsidence, changes to groundwater affecting significant trees and landscapes, and the partial or full removal of heritage places and new built form associated with North East Link during its construction and operation.</p>

Discipline	Context and key issues
Aboriginal cultural heritage	The potential for presence of Aboriginal heritage places and values within the study area was assessed in consultation with the Wurundjeri by reviewing current and historical landforms and accounts of Aboriginal occupation. A search of the Victorian Aboriginal Heritage Register identified a number of registered Aboriginal cultural heritage places and areas of cultural heritage sensitivity, such as Bolin Bolin Billabong, and historical references within the study area. Potential risks and impacts requiring assessment include impacts to Aboriginal cultural heritage values due to disturbance of Aboriginal places and disturbance or removal of Aboriginal cultural heritage materials.
Ground movement	Ground movement potential is influenced by geology and hydrogeology conditions. Potential risks and impacts requiring assessment include ground movement due to the construction of the tunnels, cross passages and other large excavations, during the construction and operation of North East Link.
Groundwater	Groundwater quality in the north-eastern region may be influenced by geology and hydrogeology conditions, which broadly consists of an alluvial aquifer and a bedrock aquifer system. Potential risks and impacts requiring assessment include changes to groundwater availability, hydraulic connectivity, moving or extracting existing contaminated groundwater, and contamination of groundwater due to spills, during the construction and operation of North East Link.
Contamination and soil	The historical and existing land uses, known potential sources of contamination and potential for acid sulfate soil and rock were assessed. Potential sources of contamination are relatively typical for suburban Melbourne and generally associated with former landfills, service stations, some other commercial uses such as dry cleaners and Defence activities at Simpson Barracks. Potential risks and impacts requiring assessment disturbance of contaminated soil, acid sulfate soil, contaminated materials, spills or leaks, release of vapours from contaminated groundwater, and potential impacts to human health and the environment during the construction of North East Link.
Surface water	The North East Link alignment would interface with a number of waterways and drainage systems including the Yando Street Main Drain, Kempston Street Main Drain, Watsonia Station Drain, Banyule Creek, Yarra River and the Koonung Creek. Potential risks and impacts requiring assessment include changes to drainage and surface water flow and quality, and impacts to private properties, public safety, and river bed and bank erosion due to flooding.
Ecology	North East Link would be constructed largely within a developed area. Some areas of ecological sensitivity remain and are typically associated with the Yarra River and Banyule Flats. North East Link would avoid these by tunnelling under these key assets. Other key ecological values include native vegetation and a population of Matted Flax-lily within Simpson Barracks. Potential risks and impacts requiring assessment include impacts on terrestrial and aquatic ecology including native vegetation and flora and fauna species and communities during the construction and operation of North East Link. This includes impacts on habitats which species may depend upon, including waterways within and adjacent to North East Link.
Greenhouse gas	Victoria has set a target of net-zero emissions by 2050. Potential risks and impacts requiring assessment include changes to greenhouse gas emission levels due to the construction and operation of North East Link.

3 Risk method

3.1 Overview

The Ministerial guidelines do not prescribe how the risk assessment is to be carried out. The North East Link EES risk assessment has therefore been carried out in general accordance with the risk process guidance outlined in the section 5 of the Australian Standard AS/NZS ISO 31000:2009, Risk management – Principles and guidelines.

AS/NZS ISO 31000:2009 was the current Australian standard at the time of developing the risk assessment process and carrying out the risk assessment. AS/NZS ISO 31000:2009 has since been superseded by the Australian Standard AS ISO 31000:2018 Risk management – guidelines, which was approved on 19 September 2018 and published on 30 October 2018. The guidance outlined in AS ISO 31000:2018 has been reviewed and would not materially alter the approach taken to the EES risk assessment.

AS/NZS ISO 31000:2009 requires a risk management process to include seven main elements as shown in Figure III-2. The following sections describe how these elements have been addressed. The impact assessments carried out as part of this EES have both informed and been informed by the risk assessment process.

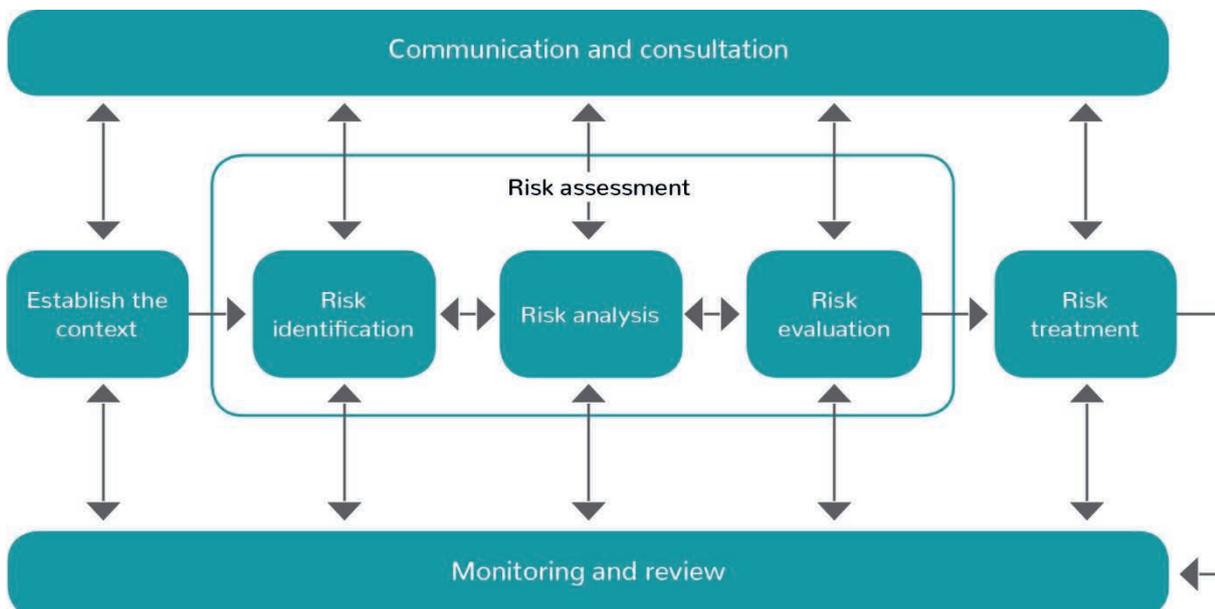


Figure III-2 Risk management process (sourced from AS/NZS ISO 31000:2009)

3.2 Establishing the context

Establishing the context of the risk assessment included defining the risk assessment scope and objectives, as described in Section 1.2, and the external and internal parameters to be taken into account when identifying, analysing, evaluating and treating risk.

External and internal parameters that informed the context for the North East Link EES included the:

- Development of the reference project as summarised in Section 2.2 and described in detail in EES Chapter 6 – Project development and Chapter 8 – Project description,
- Environmental setting of the project as summarised in Section 2.3 and described in detail in EES Chapters 9 to 26 and the technical reports
- Approval requirements as described in Chapter 3 – Legislative framework
- EES evaluation objectives and scoping requirements to be addressed by the EES as described in Chapter 4 – EES Assessment framework.

3.3 Risk identification

Identification and development of a comprehensive list of risks was a key step in the risk process. Identified risks were documented as ‘risk pathways’ which describe the potential interaction of the project with assets, values and uses.

Risk identification was undertaken systematically by technical specialists with technical knowledge specific to each discipline. This was undertaken based on the project description presented in Chapter 8 – Project description. Issues identified through the preliminary screening analysis for the concept design were used as a starting point for risk identification and expanded on to develop detailed, project-specific risk pathways. Studies and learnings from recent major Victorian transport projects were also taken into account.

While risk identification occurred early in the risk process, the list of risk pathways was regularly reviewed and, where required, updated throughout the preparation of the EES. As further information was made available through the development of the reference project and progression of the technical assessments, the list of risk pathways was reviewed and updated to reflect this. Risk pathways were added, removed and refined by technical specialists and communicated as relevant to other technical specialists and the design team.

3.4 Risk analysis

Risk analysis involves developing an understanding of the risk pathways. Consequence and likelihood criteria were developed and tailored to inform this process based on the risk assessment context outlined in Section 3.2.

Risks to assets, values and uses were informed by technical studies. The technical studies assessed whether risk pathways were legitimate, considered and evaluated the measures available to mitigate the potential effects, reviewed the likelihood of the effects occurring, and assessed the probable impact from effects.

Risk analysis was an iterative process. As the reference project was developed, and technical reports progressed, risk pathways underwent cycles of risk analysis, evaluation, treatment and re-analysis. The risk analysis of consequence, likelihood and level of risk were refined to reflect the current available information. This process is shown in Figure III-3.

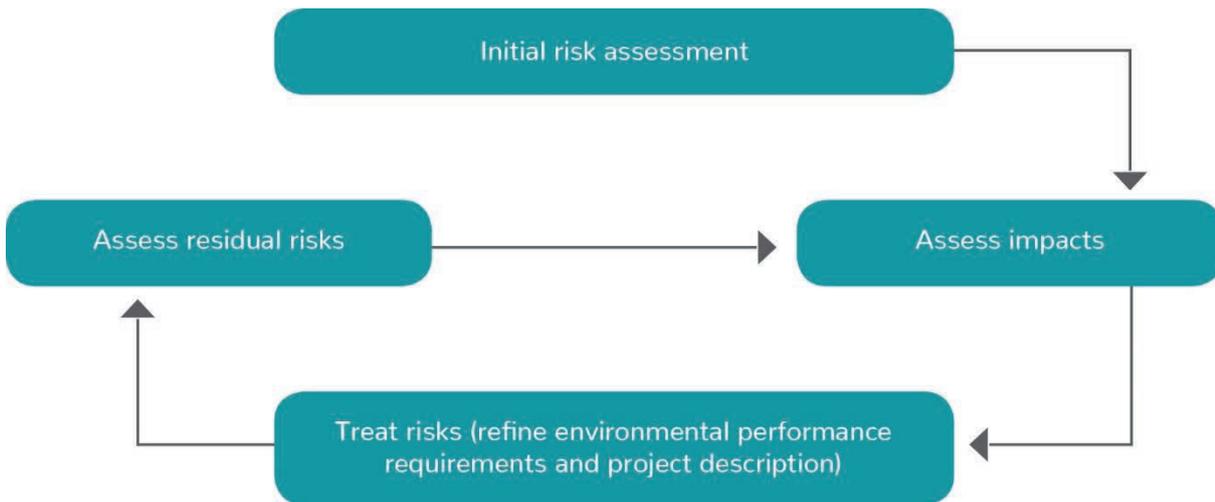


Figure III-3 Risk analysis process

3.4.1 Rating risk

Once risk pathways were determined, and some degree of impact assessment had been undertaken, each risk pathway was assigned an initial risk rating. This rating was determined by considering the likelihood and consequence of an event occurring. In assessing the consequence, the extent, severity and duration of the risks were considered. Risk ratings were then reassessed following risk evaluation (Section 3.5) and risk treatment (Section 3.6) to generate a 'residual' risk rating. Both initial and residual risk ratings were documented in a risk register.

This process is shown in Figure III-4 and discussed below.

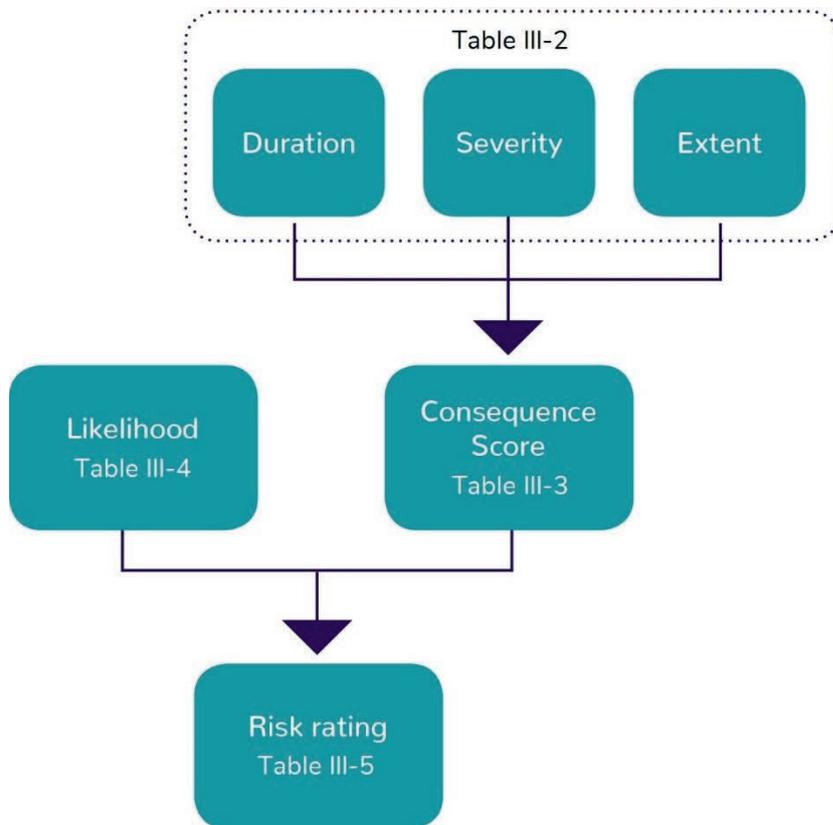


Figure III-4 Assessing risk ratings

Consequence criteria

‘Consequence’ refers to the maximum credible outcome of an event affecting an asset, value or use. Consequence criteria are presented in Table III-2 and have been developed for the North East Link EES in the form of whole of EES criteria rather than discipline-specific criteria to enable a consistent assessment of consequence across the range of potential environmental effects.

Consequence criteria were assigned based on the maximum credible consequence of the risk pathway occurring. Where there was uncertainty or incomplete information, a conservative assessment was made on the basis of the maximum credible consequence.

Consequence criteria have been developed to consider the following characteristics:

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

The descriptors for these characteristics guided the specialists to consistently define and rate the maximum credible consequence. In applying the severity criteria specialists have taken into account discipline-specific factors such as legislative status, vulnerability and rarity of assets, values and uses. Severity has been assigned a greater weighting than extent and duration as this is considered the most important characteristic.

Each risk pathway was then assigned a value for each of the three characteristics, which were added together to provide an overall consequence rating as shown in Table III-3.

Table III-2 Consequence criteria

Characteristic	Factor	Value
Extent	Wider region	4
	Corridor	3
	Municipality	2
	Local	1
Severity	Very high A very high degree of impact on an environmental asset, value or use of moderate or higher significance, or A very high number of impacts on environmental assets, values or uses, or Impacts on environmental assets, values or uses of very high significance.	8
	High A high degree of impact on an environmental asset, value or use of moderate or higher significance, or A high number of impacts on environmental assets, values or uses, or Impacts on environmental assets, values or uses of high significance.	6
	Medium A moderate degree of impact on an environmental asset, value or use of moderate or higher significance, or A moderate number of impacts on environmental assets, values or uses, or Impacts on environmental assets, values or uses of moderate significance.	4
	Low A low degree of impact on an environmental asset, value or use, or A low number of impacts on environmental assets, values or uses, or Impacts on environmental assets, values or uses of lower significance.	2
	Very low A very low degree of impact on an environmental asset, value or use, or A very low number of impacts on environmental assets, values or uses, or Impacts on environmental assets, values or uses of very low significance	0

Characteristic	Factor	Value
Duration	Permanent (>7 years)	4
	Long term construction (>2 – 7 years)	3
	Medium term construction (>3 months – 2 years)	2
	Short term construction (0 – 3 months)	1

Table III-3 Consequence ratings

Value total	Overall consequence
2-4	Negligible
5-7	Minor
8-10	Moderate
11-13	Major
14-16	Severe

Likelihood criteria

'Likelihood' refers to the chance of an event happening and the maximum credible consequence occurring from that event. The likelihood criteria for North East Link are provided in Table III-4.

Table III-4 Likelihood criteria

Planned	The event is certain to occur
Almost certain	The event is almost certain to occur one or more times a year
Likely	The event is likely to occur several times within a five-year timeframe
Possible	The event may occur once within a five-year timeframe
Unlikely	The event may occur under unusual circumstances but is not expected (ie once within a 20-year timeframe)
Rare	The event is very unlikely to occur but may occur in exceptional circumstances (ie once within a 100-year timeframe)

Risk matrix

Risk levels were determined using the matrix in Table III-5. The consequence and likelihood were assessed using the criteria in Table III-3 and Table III-4 above.

Table III-5 Risk rating

Likelihood	Consequence				
	Negligible	Minor	Moderate	Major	Severe
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
Planned	Planned (negligible consequence)	Planned (minor consequence)	Planned (moderate consequence)	Planned (major consequence)	Planned (severe consequence)

Planned events

North East Link would result in some planned events, being events with outcomes that are certain to occur (ie planned impacts such as land acquisition), as distinct from risk events where the chance of the event occurring and its consequence is uncertain. Although planned events are not risks, these were still documented in the risk register for completeness and assigned a consequence level in order to enable issues requiring further assessment or treatment to be prioritised.

These planned events were assessed further through the impact assessment process.

3.4.2 Calibration of risk assessments

Once initial risk ratings were established, these were tested at a multi-disciplinary facilitated workshop. EES specialists presented the findings of their assessments with a particular focus on risks with medium or higher ratings and justifications for risk ratings. This promoted consistency across risk analysis between disciplines and identification of any cross-over and inconsistencies in risk pathways.

Following the workshop, the risk registers for each discipline were updated and guided their ongoing investigations. Groups of specialists from inter-related disciplines met regularly through the EES process to share information and findings, enabling a consistent approach to risk and impact assessment across the project.

Calibration of risk assessments has also occurred through the use of consequence criteria provided in Table III-2. The criteria have been set up to provide a consistent framework to determine consequence across the disciplines. Risk registers have been reviewed as part of the preparation of the EES to check that consequence and likelihood criteria have been consistently applied.

3.5 Risk evaluation

The results of the risk analysis were evaluated to determine the next steps for each risk pathway.

Where initial risk ratings were found to be 'medium' or higher, or were planned events with a consequence of 'minor' or higher, EES specialists identified options for additional or modified EPRs or design changes to reduce the consequence or likelihood of the risk. These treatment options were reviewed by the broader project team to assess their feasibility and the potential for new or modified risks to arise from the treatment option.

Where additional or modified EPRs or design changes were adopted, risk pathways were subject to further risk analysis to determine the subsequent risk rating.

Where it was found that further information was required to evaluate a risk pathway, further investigations were undertaken.

3.6 Risk treatment

To guide the initial risk assessment, an initial project description was developed based on the reference project at that point in time and a set of initial EPRs were developed. These initial EPRs reflected compliance with legislation, policy and guideline requirements as well as regulator expectations as reflected in recent major Victorian transport projects.

As the assessment and evaluation of risks progressed, additional EPRs were added to the initial set of EPRs and existing EPRs were refined. In some cases, the reference project was refined in response to technical reports, and the project description updated. Following these additional risk treatments, the risk analysis and evaluation was undertaken again to assess the new residual risk ratings. The final impact assessment discussion, included in technical reports and chapters, is based on the residual risk levels and therefore assumes successful implementation of EPRs. In practical terms, 'successful implementation' means that the types of controls known to be available to achieve the EPR have been implemented by suitably qualified and competent practitioners.

The final EPRs form a component of the Environmental Management Framework for delivery of North East Link as presented in Chapter 27 – Environmental management framework.

3.7 Communication and consultation

Communication and consultation has informed the risk process in a number of ways. Communication and consultation has occurred with internal stakeholders including the broader North East Link Project (NELP) team and their consultants, and external stakeholders including agencies, regulators, and the community.

Internal stakeholders have been primarily engaged through review of technical studies, input into workshops and discussions around EPRs and design options. Internal stakeholders have contributed to a robust risk assessment process by contributing a diverse range of viewpoints and experience in project delivery. Internal stakeholders have spanned disciplines including technical, engineering, land, planning, environment, communications and engagement.

The Technical Reference Group (TRG) was a key forum to receive feedback and communicate with agency and regulator stakeholders. The TRG, convened by the Department of Environment, Land, Water and Planning (DELWP) to provide for agencies to advise the Department and the proponent on the preparation of the EES, includes key stakeholders such as the Banyule, Boroondara, Manningham, Whitehorse and Yarra and Nillumbik councils, Melbourne Water, Parks Victoria, the Environment Protection Authority (Victoria), Department of Health and Human Services (Victoria), Aboriginal Victoria, the Wurundjeri Woi-wurrung Cultural Heritage Aboriginal Corporation, Heritage Victoria, VicRoads, Public Transport Victoria, Transport for Victoria, Victorian Planning Authority and VicTrack. The TRG has reviewed and had the opportunity to provide feedback on all the draft technical studies and EES documentation.

To understand the key issues of particular concern to local communities and stakeholders, a comprehensive program of public engagement was undertaken. This program sought to keep the community informed about project progress, obtain input on project design and development, and identify and respond to stakeholder and interests, concerns and preferred outcomes. This has included consultation sessions, online forums, surveys, videos, interviews and individual discussions. Community Liaison Groups and Community Technical Discussion Groups were also established to provide ongoing feedback throughout the development of the EES.

Consultation was fed into the risk assessment in a number of ways. Community priorities were considered when defining the scope of technical reports, articulated as risk pathways, contributed to risk ratings and formed part of risk treatment options.

Chapter 5 – Communications and engagement provides further detail on stakeholder and community engagement for North East Link.

3.8 Monitoring and review

As North East Link is currently in the planning stage, the monitoring and review step primarily involved review of risks as further technical assessment was undertaken, the design of the reference project progressed and further controls were developed.

Risk pathways and risk ratings were continually reviewed as further information became available through technical reports, design updates and stakeholder consultation. EPRs were also subject to ongoing review by specialists and stakeholders to improve risk outcomes.

During the construction and operation of North East Link, environmental risks would be subject to monitoring, review and continuous improvement. EPRs would be embedded in project contracts and performance against these monitored and reviewed through the proposed governance arrangements outlined in Chapter 27 – Environmental management framework. This includes requirements for contractors to carry out a detailed risk assessment and develop and implement controls based on their detailed design and proposed activities and methods for construction and operation.

4 Risk results

4.1 Overview

A range of risk pathways were identified and assessed by specialists during the EES process. The initial risk assessment rated these risk pathways as very low, low, medium, high and very high. Where risk pathways were identified as certain to occur these were noted as 'planned' events and considered as impacts rather than risks.

This section presents a summary of the risk pathways with residual risks identified as medium or above and planned events. These risks and associated impacts are discussed in more detail in the EES Chapters 9 to 26 and the EES technical reports. Each EES technical report discusses relevant risks in detail as well as the information that has informed the assessment and rating of these risks.

The outcomes of the North East Link risk process were documented in the risk registers contained in each of the EES technical reports. A consolidated register is presented in Appendix A.

In some instances the register shows that risk levels have changed between the initial and residual risk assessment but the titles of the EPRs listed in the register have not. The change in risk level reflects that between the initial risk assessment and the residual risk assessment the design has been refined, further assessment has been carried out to better understand the risk pathways, and the listed EPRs have been amended where required to include additional or refined requirements.

4.2 Residual risks rated as high and very high

No risks pathways were assessed as having a high or very high residual risk.

4.3 Residual risks rated as medium

4.3.1 Construction

Following risk treatment and application of EPRs, a range of pathways associated with the construction of North East Link were assessed as having a medium residual risk. In general these residual risks relate to:

- Disturbance or destruction of Aboriginal cultural heritage and historic heritage place(s) or values
- Traffic, air quality, surface noise, visual and overshadowing-related impacts on human health, amenity and traffic movements, accessibility and travel times for surrounding land uses, businesses, community facilities and the community
- Uncertainty or acquisition of businesses impacting on viability of businesses and availability of local jobs and services
- Acquisition of residential properties disrupting established social networks and requiring residents to re-establish and adapt to a different place
- Construction works and location of infrastructure close to residential properties leading to impacts such as on amenity, lifestyle, liveability and disruption to daily life and activities
- Potential for ground movement to result in impacts to 'Helmet', a sculptural installation owned by Manningham City Council
- Flooding and water quality impacts associated with construction works.

These risk pathways and potential impacts would require ongoing management and monitoring through the Environmental Management Framework and project EPRs. Measures required by the EPRs to achieve these residual risk ratings would be implemented through the contractors' Construction Environmental Management Plan, and other plans required by the EPRs including the Archaeological Management Plan, Surface Water Management Plan, Transport Management Plan, Air Quality Management Plan and Construction Noise Vibration Management Plans.

The risk of disturbance or destruction of Aboriginal cultural heritage place(s) and values would be managed through an approved Cultural Heritage Management Plan.

Disruption, amenity and access impacts on businesses and the community would be minimised to the extent practicable. Community and business liaison groups would be established to facilitate communications and business and community involvement in the construction phase of North East Link.

A geotechnical model and ground movement plan would be established based on the detailed design and proposed construction techniques to mitigate and monitor potential ground movement impacts. Repair works or other actions would be taken for properties or assets affected by ground movement caused by North East Link.

All surface water and waste water discharges and runoff from the project would be required to meet the requirements of the State Environment Protection Policy (Waters). Permanent and temporary construction works and works on waterways would need to be carried out in a manner that does not increase flood risk and to the requirements of the relevant drainage authority.

4.3.2 Operation

Following risk treatment and application of EPRs, a range of risk pathways associated with the operation of North East Link were assessed as having a medium residual risk. In general these residual risks relate to:

- Permanent project infrastructure preventing the re-establishment of tree canopy cover
- Traffic, air quality and engine brake noise related impacts on human health and amenity for surrounding land uses, businesses, and the community
- Ecological and heritage impacts due to changes to groundwater conditions and waterway form
- Permanent infrastructure such as noise walls and elevated structures overshadowing places of ecological value (such as Koonung Creek)
- Flooding and water quality impacts associated with permanent infrastructure.

Measures to address these risk pathways would be considered as part of the detailed design process in accordance with the EPRs and in consultation with relevant stakeholders. Urban Design and Landscape Plans would be developed for permanent works in accordance with the North East Link Incorporated Document.

Risk pathways relating to the operation of North East Link would require ongoing management and monitoring through the Environmental Management Framework and EPRs. Measures required by the EPRs to achieve these residual risk ratings would be implemented through the operator's Operation Environmental Management Plan, and other plans required by the EPRs including a Tree Canopy Replacement Plan, a Groundwater Dependent Ecosystem Monitoring and Mitigation Plan, a Salvage and Translocation Plan for Matted Flax-lily, a Communications and Community Engagement Plan, and Flood Emergency Management Plans. The EPRs also require monitoring during operation, including of ambient air quality and ventilation structure emissions, recovery of groundwater levels and quality, traffic noise, and traffic performance.

4.4 Planned events

This section provides an overview of the types of pathways that were identified as planned events and assessed further through the impact assessment process. The consequence ratings presented here are based solely on the risk criteria described in Section 3.4. Further analysis and evaluation of the impacts arising from these planned events and information on how these would be managed is provided in the EES Chapters 9 to 26 and the EES technical reports.

4.4.1 Construction

Planned events with a residual consequence rating of major, following application of EPRs, related to:

- Planned removal of trees for construction resulting in reduction of urban forest canopy cover
- Permanent acquisition of INZ1 land in Bulleen displacing businesses and reducing the number of jobs available for workers in the area
- Construction works and permanent infrastructure having a direct physical and/or visual impact on heritage places listed in the planning schemes with an adverse impact on heritage values
- Land clearing and consumption of materials and electricity generated from fossil fuels, operation of plant and equipment, and transportation of materials and equipment during construction resulting in the release of greenhouse gas emissions which could contribute to global climate change
- Land use changes brought by the project which may result in inconsistencies with planning policies and strategic plans.

Planned events with a residual consequence of moderate, following application of EPRs, included:

- Land clearing during construction impacting threatened and non-threatened native vegetation and loss of habitat for non-threatened fauna
- Construction works and permanent infrastructure have a direct physical and/or visual impact on places of potential heritage significance but with no statutory controls with an adverse impact on heritage values
- Construction activities requiring permanent acquisition of residential properties or open space resulting in permanent changes in land use or permanent changes to residential or open space land use character
- Construction activities requiring permanent acquisition of commercial and industrial land (eg Bulleen industrial precinct), resulting in permanent change to commercial and industrial land use
- Construction activities requiring temporary occupation of open space or education and community facilities, resulting in a temporary change in land use
- Landscape and visual impacts associated with adverse impacts to views due to construction works.

Planned events with a residual consequence of minor, following application of EPRs, included:

- Construction work or the establishment of construction sites disturbing historical archaeological sites listed on the Victorian Heritage Inventory (eg Yarra Bend Park H7922-0142).

The EPRs outline a range of requirements and measures to address the impacts of these planned events and achieve these residual consequence ratings. In particular, the EPRs require the need for vegetation removal, acquisition, and impacts on heritage places to be minimised to the extent practicable during detailed design. Where these events occur, activities and their potential impacts would be managed through the contractors' Construction Environmental Management Plan, and other plans required by the EPRs including an Archaeological Management Plan and Tree Protection Plan.

Where the removal of native vegetation is unavoidable, native vegetation removal would be assessed and offset in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*, DELWP December 2017. In addition, a Tree Canopy Replacement Plan would be developed and implemented to achieve an overall net gain in tree canopy.

The business and social EPRs outline a range of requirements for engaging with, minimising disruption to, and supporting businesses and the community who are impacted by acquisition. A Communications and Community Engagement Plan would be developed and implemented to engage and consult the community and potentially affected stakeholders. Community Liaison and Business Liaison Groups would also be established to share information and further facilitate community and stakeholder involvement. Consultation would also occur with land managers and authorities responsible for implementing relevant strategic land use policies.

Archival photographic recording of all heritage places disturbed by the works would be carried out in accordance with Heritage Victoria's requirements.

Greenhouse gas emissions would be minimised through sustainable design practices and implementation of a Sustainability Management Plan.

4.4.2 Operation

This section summarises the planned events associated with operation of North East Link. Further analysis and evaluation of the impacts arising from these planned events and information on how these would be managed is provided in the EES Chapters 9 to 26 and the EES technical reports.

Planned events with a residual consequence of severe, following application of EPRs, related to:

- Landscape and visual impacts associated with changes to landscape character and new infrastructure for North East Link.

Planned events with a residual consequence of moderate, following application of EPRs, related to:

- Greenhouse gas emissions associated with operation and maintenance activities for North East Link and changes in greenhouse gas emissions (increase or decrease) associated with changed vehicle flows due to North East Link

- Changes within the community from the permanent loss of green space and tree canopy areas resulting in impacts on the health and wellbeing of the community
- Landscape and visual impacts associated with shading and lighting.

The EPRs outline a range of requirements and measures to address the impacts of these planned events to achieve these residual consequence ratings.

Greenhouse gas emissions would be minimised through sustainable design practices and implementation of a Sustainability Management Plan.

Landscape and visual impacts would be addressed through the design of North East Link, which is required to be generally in accordance with the Urban Design Strategy. The design response is required to avoid or minimise landscape and visual, overlooking and shading impacts to the extent practicable and to meet relevant lighting standards. Urban Design and Landscape Plans would be developed for permanent works in accordance with the north East Link Incorporated Document.

5 Conclusion

The EES risk assessment process has assisted in identifying environmental risks and planned events requiring further assessment and management. This has assisted to focus the impact assessment and informed development of the reference project and EPRs.

Following implementation of the EPRs some risks remain medium and there are some planned events. The Environmental Management Framework and EPRs contain requirements to minimise these risks and impacts to the extent practicable through design. A range of management plans to manage and monitor potential risks and impacts, including a Construction Environmental Management Plan and Operational Environmental Management Plan and issue-specific technical and sub-plans would also be required to be developed and implemented to meet the requirements of the Environmental Management Framework and EPRs.

The project contracts would require contractors to design, construct and operate North East Link in accordance with the Environmental Management Framework and EPRs. Chapter 27 – Environmental management framework describes the EMF and how EPRs would be implemented and compliance assessed.

Under the Environmental Management Framework, contractors would be required to prepare detailed environmental risk assessments to reflect the risks associated with the detailed design and specific work methods. These risk assessments would inform contractor's work methods and development of the management plans required by the Environmental Management Framework and EPRs.

An Independent Environmental Auditor would be appointed and review the adequacy of contractor documentation, including their environmental risk assessments, and compliance with the Environmental Management Framework and EPRs.

Appendix A Risk register

A.1 Construction risks

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk							
			Magnitude of effect						Magnitude of effect							
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		
Aboriginal Culture Heritage																
AH01	Disturbance/destruction of registered Aboriginal cultural heritage place(s) and/or associated cultural values in a deteriorated condition with a high degree of disturbance evident and some cultural heritage remaining.	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Very low	7+ years	Minor	Almost certain	Medium	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Very low	7+ years	Minor	Almost certain	Medium	
AH02	Disturbance/destruction registered Aboriginal cultural heritage place(s) and/or associated cultural values of common occurrence with a limited range of cultural materials, in fair to good condition with some degree of disturbance evident.	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Low	7+ years	Moderate	Possible	Medium	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Low	7+ years	Moderate	Possible	Medium	
AH03	Disturbance/destruction of registered Aboriginal cultural heritage place(s) and/or associated cultural values of rare occurrence and/or with a large number and diverse range of cultural materials and/or stratified deposits.	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Medium	7+ years	Major	Rare	Medium	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Medium	7+ years	Major	Rare	Medium	
AH04	Disturbance/destruction of registered Aboriginal cultural heritage place(s) and/or associated cultural values of exceptional value as identified by the RAP and/or Aboriginal Victoria and/or Traditional Owners, for example, a burial.	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Very high	7+ years	Severe	Rare	Medium	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Very high	7+ years	Severe	Rare	Medium	

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
AH05	Disturbance/destruction of previously unregistered Aboriginal cultural heritage place(s) and/or associated cultural values of exceptional value as identified by the RAP and/or Aboriginal Victoria and/or Traditional Owners, for example, a burial.	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Medium	7+ years	Major	Rare	Medium	EPR AH1 – Comply with the Cultural Heritage Management Plan.	Corridor	Medium	7+ years	Major	Rare	Medium
Air Quality															
AQ01	North East Link surface roads: site clearance & construction site establishment. Deposition of larger dust particles causing physical discomfort (for example eye and throat irritation), deposition on man-made and vegetation surfaces causing soiling and annoyance and aesthetic impacts on buildings and vehicles at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 months to 2 years	Minor	Possible	Low
AQ02	North East Link surface roads: earthworks. Deposition of larger dust particles causing physical discomfort (for example eye and throat irritation), deposition on man-made and vegetation surfaces causing soiling and annoyance and aesthetic impacts on buildings and vehicles at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 months to 2 years	Minor	Almost Certain	Medium	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Low	Medium	3 months to 2 years	Minor	Almost Certain	Medium
AQ03	North East Link surface roads: earthworks. Generation of PM ₁₀ and PM _{2.5} from soil disturbance causing health impacts at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 month to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 month to 2 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
AQ04	North East Link surface roads: earthworks. Generation of odour due to exposure, stockpiling and transportation of contaminated or anaerobic soil, with resultant aesthetic impacts on sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR CL3 – Minimise odour impacts during spoil management.	Local	Medium	0–3 Months	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR CL3 – Minimise odour impacts during spoil management.	Local	Medium	0–3 Months	Minor	Possible	Low
AQ05	North East Link surface roads: earthworks. Products of combustion (including PM ₁₀ , PM _{2.5} , CO, NO _x , SO ₂ , VOC and SVOC) resulting from operation of diesel fuelled heavy equipment impacting on sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	3 months to 2 years	Minor	Possible	Low
AQ06	North East Link surface roads: construction of surface roads and other civil infrastructure. Deposition of larger dust particles causing physical discomfort (for example eye and throat irritation), deposition on man-made and vegetation surfaces causing soiling and annoyance and aesthetic impacts on buildings and vehicles at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Almost certain	Medium	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Almost certain	Medium
AQ07	North East Link surface roads: construction of surface roads and other civil infrastructure. Generation of PM ₁₀ and PM _{2.5} from soil disturbance causing health impacts at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Likely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
AQ08	North East Link surface roads: construction of surface roads and other civil infrastructure. Generation of odour due to laying of asphalt with resultant aesthetic impacts on sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Almost certain	Medium	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	0–3 months	Minor	Almost certain	Medium
AQ09	North East Link surface roads: construction of surface roads and other civil infrastructure. Products of combustion (including PM ₁₀ , PM _{2.5} , CO, NOx, SO ₂ , VOC and SVOC) resulting from operation of diesel fuelled heavy equipment impacting on sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	0–3 months	Negligible	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	0–3 months	Negligible	Possible	Low
AQ10	Tunnels: site clearance & construction site establishment. Deposition of larger dust particles causing physical discomfort (for example eye and throat irritation), deposition on man-made and vegetation surfaces causing soiling and annoyance and aesthetic impacts on buildings and vehicles at sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	3 months to 2 years	Minor	Possible	Low
AQ11	Tunnels: dive structure/portal and tunnel construction. Deposition of larger dust particles causing physical discomfort (for example eye and throat irritation), deposition on man-made and vegetation surfaces causing soiling and annoyance and aesthetic impacts on buildings and vehicles at sensitive receptor locations.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL3 – Minimise odour impacts during spoil management.	Local	Medium	3 months to 2 years	Minor	Likely	Medium	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL3 – Minimise odour impacts during spoil management.	Local	Medium	3 months to 2 years	Minor	Likely	Medium

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
AQ12	Tunnels: precast plant construction and manufacturing of precast units. Potential impact on air quality due to dust, odour or other emissions for plant affecting sensitive receptor locations.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Low	3 months to 2 years	Minor	Possible	Low
AQ13	Tunnels: tunnelling activities. Generation of odour from tunnel ventilation during tunnel boring operations and exposure, stockpiling and transportation of contaminated or anaerobic soil, with resultant aesthetic impacts on sensitive receptor locations.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL3 – Minimise odour impacts during spoil management.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR CL3 – Minimise odour impacts during spoil management.	Local	Medium	3 months to 2 years	Minor	Possible	Low
Arboriculture															
AR01	Removal of trees for construction resulting in reduction of urban forest canopy cover.	EPR AR1 – Maximise retention of trees.	Corridor	High	7+ years	Major	Planned	Planned	EPR AR1 – Maximise retention of trees.	Corridor	Medium	7+ years	Major	Planned	Planned
AR02	Damage to trees on periphery of construction leading to death, damage or destabilisation, including mechanical impacts from cranes, piling rigs and vehicular access resulting in damage to tree crowns; lopping of tree crowns for installation of temporary aerial services leading to damage to trees by poor pruning practices.	EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained.	local	low	7+ years	Minor	Possible	Low	EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained.	local	low	7+ years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
AR03	Modification to adjacent soil profiles resulting in droughting, waterlogging and/or deoxygenation of root zones leading to reduced tree health or death primarily due to construction access through parkland, including set down areas resulting in soil compaction and reduced tree health.	EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained.	local	low	7+ years	Minor	Possible	Low	EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained.	local	low	7+ years	Minor	Possible	Low
Business Impacts															
BU01	Uncertainty for businesses about the future business environment may reduce business viability and therefore the availability of local jobs and services.	EPR B1 – Business support.	Corridor	Low	3 month to 2 years	Minor	Almost certain	Medium	EPR B1 – Business support.	Corridor	Low	3 month to 2 years	Minor	Almost certain	Medium
BU02	Preparatory works such as the relocation of utilities may cause interruption to the availability of utilities and disrupt business operations.	EPR B5 – Minimise impacts on utility assets.	Municipality	Medium	2–7 years	Minor	Possible	Low	EPR B5 – Minimise impacts on utility assets.	Municipality	Medium	2–7 years	Minor	Possible	Low
BU03	Permanent acquisition of INZ1 land in Bulleen displaces businesses and reduces the number of jobs available for workers in this area.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Low	2–7 years	Moderate	Planned	Planned	EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Low	2–7 years	Major	Planned	Planned
BU04	Permanent acquisition of INZ1 land in Bulleen displaces businesses and impacts on the viability of remaining businesses in the area that have linkages with displaced businesses.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Corridor	Very low	2–7 years	Minor	Likely	Medium	EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Corridor	Very low	2–7 years	Minor	Possible	Low
BU05	Full acquisition of land results in displacement of businesses along alignment and therefore reduces availability of local jobs and services.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Low	2–7 years	Minor	Almost certain	Medium	EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Low	2–7 years	Minor	Almost certain	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
BU06	Partial acquisition of business land causes disruption or reduced viability of businesses or commercial facilities.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Medium	2-7 years	Minor	Likely	Medium	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation. EPR B4 – Minimise access and amenity impacts on businesses.	Local	Medium	2-7 years	Minor	Unlikely	Low
BU07	Full acquisition of business land results in business displacement which reduces business viability.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Corridor	Low	2-7 years	Moderate	Likely	Medium	EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Corridor	Low	2-7 years	Moderate	Likely	Medium
BU08	Temporary occupation of sites for construction reduces the viability of neighbouring or occupied businesses and commercial facilities.	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Low	2-7 years	Moderate	Likely	Medium	EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation. EPR B4 – Minimise access and amenity impacts on businesses.	Local	Low	2-7 years	Minor	Almost certain	Medium
BU09	Areas required for construction, materials storage, and stockpiling causes adverse impacts to views and amenity experienced from businesses where view and amenity is part of the customer experience eg businesses with outdoor serving areas, child care centres.	EPR B4 – Minimise access and amenity impacts on businesses.	Corridor	Low	2-7 years	Moderate	Almost certain	High	EPR B4 – Minimise access and amenity impacts on businesses. EPR B6 – Business liaison groups. EPR LV2 – Minimise landscape impacts during construction. EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.	Corridor	Low	2-7 years	Minor	Almost Certain	Medium
BU10	Areas required for construction, materials storage, and stockpiling in the vicinity of schools reduces the attractiveness of the school experience and may impact on the ability to attract and retain students.	EPR B4 – Minimise access and amenity impacts on businesses.	Corridor	Very low	2-7 years	Minor	Likely	Medium	EPR B4 – Minimise access and amenity impacts on businesses. EPR B6 – Business Liaison Groups EPR NV3 – Minimise construction noise impacts to sensitive receptors.. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.	Corridor	Very low	2-7 years	Minor	Almost Certain	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
BU11	Increased travel time from changed traffic patterns during construction reduce the attractiveness of retail and service businesses.	EPR B4 – Minimise access and amenity impacts on businesses.	Local	Medium	2-7 years	Moderate	Almost certain	Medium	EPR B4 – Minimise access and amenity impacts on businesses. EPR T2 – Transport Management Plan(s) (TMP).	Local	Medium	2-7 years	Minor	Almost certain	Medium
BU12	Road detours or other changed road and car parking conditions during construction cause reduced ease of access for deliveries, staff and customers thereby disrupting business operations.	EPR B4 – Minimise access and amenity impacts on businesses.	Corridor	Low	2-7 years	Moderate	Almost certain	High	EPR B4 – Minimise access and amenity impacts on businesses. EPR B6 – Business liaison groups. EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Low	2-7 years	Minor	Likely	Medium
Contamination and Soil															
CT01	Earthworks requiring excavation, stockpiling, transport and treatment/disposal of contaminated soil causes impacts to human health (via direct contact and vapour inhalation) and the environment.	EPR CL1 – Implement a Spoil Management Plan	Local	Medium	3 months to 2 years	Minor	Likely	Medium	EPR CL1 – Implement a Spoil Management Plan	Local	Medium	3 months to 2 years	Minor	Possible	Low
CT02	Earthworks requiring excavation, stockpiling, transport and treatment/disposal of acid sulfate soil and rock causes impacts to human health (via direct contact and vapour inhalation) and the environment.	EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Corridor	Medium	2-7 years	Moderate	Possible	Medium	EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Corridor	Medium	2-7 years	Moderate	Unlikely	Low
CT03	Encountering asbestos-containing material that had not been assessed and identified prior to/during excavation results in adverse health (via direct contact and vapour inhalation) and the environment impacts.	EPR CL1 – Implement a Spoil Management Plan	Local	High	3 months to 2 years	Moderate	Possible	Medium	EPR CL1 – Implement a Spoil Management Plan	Local	High	3 months to 2 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
CT04	Encountering waste materials containing hazardous substances in former landfill(s) and/or uncontrolled fill site(s) (known or unknown) causes impacts to human health.	EPR CL1 – Implement a Spoil Management Plan	Local	High	3 months to 2 years	Moderate	Possible	Medium	EPR CL1 – Implement a Spoil Management Plan	Local	Medium	3 months to 2 years	Minor	Possible	Low
CT05	Excavation of contaminated soil generates offensive odour causing impacts to human health and loss of amenity to sensitive receptors.	EPR CL3 – Minimise odour impacts during spoil management.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR CL3 – Minimise odour impacts during spoil management.	Local	Low	3 months to 2 years	Minor	Possible	Low
CT06	Earthworks leading to movement of underground gases that have the potential to build in enclosed spaces and present a public safety risk.	none	Local	High	3 months to 2 years	Moderate	Unlikely	Low	EPR CL4 – Minimise risks from vapour and ground gas intrusion.	Local	High	3 months to 2 years	Moderate	Rare	Low
CT07	Spills and leaks from construction equipment causes contamination of soil leading to impacts to public health and the environment.	EPR CL5 – Manage chemicals, fuels and hazardous materials.	Local	Very low	3 months to 2 years	Negligible	Likely	Low	EPR CL5 – Manage chemicals, fuels and hazardous materials.	Local	Very low	3 months to 2 years	Negligible	Likely	Low
CT08	Abstraction of groundwater causes migration of contamination onto sites that otherwise may not have been impacted, resulting in soil impact off site and causes an impact to human health and the environment.	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Medium	7+ years	Moderate	Possible	Medium	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Medium	7+ years	Moderate	Unlikely	Low
CT09	Underground construction causes migration of hazardous vapours, ground gases and/or dissolved methane and causes an impact to human health and the environment.	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods.	Municipality	Medium	7+ years	Moderate	Possible	Medium	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR CL4 – Minimise risks from vapour and ground gas intrusion. EPR CL6 – Minimise contamination risks during operation	Municipality	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect			Overall consequence	Likelihood	Risk level	Magnitude of effect			Overall consequence	Likelihood	Risk level	
			Extent	Severity	Duration				Extent	Severity	Duration				
Ecology															
EC01	Land clearing during construction impacting threatened flora and communities.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal. EPR FF5 – Obtain Flora and Fauna Guarantee Act 1988 permits.	Corridor	Very high	7+ years	Severe	Planned	Planned	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR AR3 – Implement a Tree Canopy Replacement Plan. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal. EPR FF5 – Obtain Flora and Fauna Guarantee Act 1988 permits. EPR FF7 – Implement a salvage and translocation plan for Matted Flax-lily.	Municipality	Low	7+ years	Moderate	Planned	Planned
EC02	Land clearing during construction impacting non-threatened flora and ecological communities	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Moderate	Planned	Planned	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Moderate	Planned	Planned
EC03	Construction activities resulting in erosion/sedimentation, dust, litter or release of contaminants leading to loss or degradation of non-threatened flora and ecological communities.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR FF4 – Protect aquatic habitat. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR SCC4 – Minimise and appropriately manage waste.	Municipality	Low	2–7 years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR FF4 – Protect aquatic habitat. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR SCC4 – Minimise and appropriately manage waste.	Municipality	Low	2–7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC04	Construction activities resulting in erosion/sedimentation, dust, litter or release of contaminants leading to loss or degradation of threatened flora and ecological communities.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR FF4 – Protect aquatic habitat. EPR SCC3 – Minimise and appropriately manage waste.	Local	High	2–7 years	Moderate	Unlikely	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR FF4 – Protect aquatic habitat. EPR SCC3 – Minimise and appropriately manage waste.	Local	High	2–7 years	Moderate	Rare	Low
EC05	Construction activity leading to the introduction or spread of weeds, pest species, or pathogens that leads to the reduction of ecological value.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF3 – Avoid introduction or spread of weeds and pathogens. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR SCC4 – Minimise and appropriately manage waste.	Corridor	Medium	3 months to 2 years	Moderate	Unlikely	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF3 – Avoid introduction or spread of weeds and pathogens. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR SCC4 – Minimise and appropriately manage waste	Corridor	Medium	3 months to 2 years	Moderate	Unlikely	Low
EC06	Dewatering of groundwater during construction resulting in changes to terrestrial groundwater dependent ecosystems.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GW2 – Monitor groundwater. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	High	2–7 years	Moderate	Likely	Medium	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GW2 – Monitor groundwater. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	2–7 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC07	Construction activity causes soil compaction that leads to the loss or degradation of threatened flora and ecological communities.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR FF2 – Minimise and offset native vegetation removal.	Local	Medium	2–7 years	Moderate	Unlikely	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR FF2 – Minimise and offset native vegetation removal.	Local	Medium	2–7 years	Moderate	Unlikely	Low
EC08	Construction activity causes soil compaction that leads to the loss or degradation of non-threatened flora and ecological communities.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	2–7 years	Moderate	Possible	Medium	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	2–7 years	Moderate	Unlikely	Low
EC09	Construction noise, vibration, and/or lighting resulting in elevated disturbance of threatened fauna.	EPR NV2 – Monitor traffic noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR LV3 – Minimise construction lighting impacts. EPR FF8 – Minimise intense noise and vibration impacts on Australian Grayling.	Wider region	High	3 months to 2 years	Major	Possible	High.	EPR NV2 – Monitor traffic noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR LV3 – Minimise construction lighting impacts. EPR FF8 – Minimise intense noise and vibration impacts on Australian Grayling.	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC10	Construction noise, vibration, and/or lighting resulting in a significant impact on non-threatened fauna.	EPR NV2 – Monitor traffic noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR LV3 – Minimise construction lighting impacts. EPR FF8 – Minimise intense noise and vibration impacts on Australian Grayling.	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low	EPR NV2 – Monitor traffic noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors.. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR LV3 – Minimise construction lighting impacts. EPR FF8 – Minimise intense noise and vibration impacts on Australian Grayling.	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low
EC11	Land clearing during construction resulting in the loss or degradation of habitat supporting threatened fauna.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Local	Low	7+ years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Local	Low	7+ years	Minor	Possible	Low
EC12	Land clearing during construction resulting in the loss or degradation of habitat for non-threatened fauna.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Moderate	Planned	Planned	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
EC13	Construction activities resulting in the loss of important habitat for EPBC Act Migratory species.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF2 – Minimise and offset native vegetation removal. EPR FF4 – Protect aquatic habitat. EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications.	Local	Medium	7+ years	Moderate	Rare	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF2 – Minimise and offset native vegetation removal. EPR FF4 – Protect aquatic habitat. EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications.	Local	Medium	7+ years	Moderate	Rare	Low
EC14	Habitat fragmentation resulting in reduced effectiveness of terrestrial wildlife corridors and creation of barriers to fauna movement	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR SW8 – Minimise impacts from waterway modifications. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Municipality	Medium	7+ years	Moderate	Unlikely	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR LP1 – Minimise design footprint. EPR SW8 – Minimise impacts from waterway modifications. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Municipality	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
EC15	Construction activities resulting in erosion/sedimentation, litter or release of contaminants into wetlands and waterways leading to degradation of terrestrial fauna habitat	EPR FF4 – Protect aquatic habitat. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SCC4 – Minimise and appropriately manage waste. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	2–7 years	Moderate	Unlikely	Low	EPR FF4 – Protect aquatic habitat. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SCC4 – Minimise and appropriately manage waste. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	2–7 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC16	Construction activities resulting in erosion/sedimentation, litter or release of contaminants into wetlands and waterways leading to degradation of aquatic fauna habitat.	EPR FF4 – Protect aquatic habitat. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SCC4 – Minimise and appropriately manage waste. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Municipality	Low	2-7 years	Minor	Possible	Low	EPR FF4 – Protect aquatic habitat. EPR LP1 – Minimise design footprint. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SCC4 – Minimise and appropriately manage waste. EPR CL5 – Manage chemicals, fuels and hazardous materials. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Municipality	Low	2-7 years	Minor	Possible	Low
EC17	Land clearing during construction resulting in reduced viability of non-threatened native fauna populations.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LP1 – Minimise design footprint. EPR FF1 – Minimise impacts on fauna. EPR FF2 – Minimise and offset native vegetation removal.	Municipality	Low	7+ years	Moderate	Unlikely	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LP1 – Minimise design footprint. EPR FF1 – Minimise impacts on fauna. EPR FF2 – Minimise and offset native vegetation removal.	Municipality	Low	7+ years	Moderate	Unlikely	Low
EC18	Waterway modification (eg channelisation, piping, bank stabilisation) resulting in loss or degradation of habitat for non-threatened native aquatic fauna.	EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Corridor	Low	3 months to 2 years	Minor	Possible	Low	EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC19	Construction activities resulting in the death or injury of native fauna.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF1 – Minimise impacts on fauna.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR FF1 – Minimise impacts on fauna.	Local	Low	3 months to 2 years	Minor	Possible	Low
EC20	Construction activities within/around waterways resulting in loss or degradation of habitat for threatened aquatic and terrestrial fauna.	EPR FF4 – Protect aquatic habitat. EPR FF9 – Protect fauna habitat values in existing waterbodies that are modified for drainage purposes. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability EPR. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR FF4 – Protect aquatic habitat. EPR FF9 – Protect fauna habitat values in existing waterbodies that are modified for drainage purposes. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability EPR. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Local	Medium	3 months to 2 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC21	Construction activities within/around waterways resulting in loss of connectivity and impeded passage for threatened aquatic species.	EPR FF4 – Protect aquatic habitat. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low	EPR FF4 – Protect aquatic habitat. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Wider region	Medium	3 months to 2 years	Moderate	Unlikely	Low
EC22	Construction activities within/around waterways resulting in loss of connectivity and impeded passage for non-threatened native aquatic species	EPR FF4 – Protect aquatic habitat. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Wider region	Low	3 months to 2 years	Moderate	Possible	Medium	EPR FF4 – Protect aquatic habitat. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Corridor	Low	3 months to 2 years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
EC23	Construction activities within/around waterways resulting in loss or degradation of habitat for non-threatened native aquatic and terrestrial fauna.	EPR FF4 – Protect aquatic habitat. EPR FF9 – Protect fauna habitat values in existing waterbodies that are modified for drainage purposes. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Municipality	Medium	2–7 years	Moderate	Possible	Medium	EPR FF4 – Protect aquatic habitat. EPR FF9 – Protect fauna habitat values in existing waterbodies that are modified for drainage purposes. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability. EPR CL5 – Manage chemicals, fuels and hazardous materials.	Municipality	Medium	2–7 years	Moderate	Unlikely	Low
EC24	Dewatering of groundwater during construction resulting in changes to aquatic groundwater dependent ecosystems.	EPR SW4 – Monitor water quality. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	2–7 years	Moderate	Likely	Medium	EPR SW4 – Monitor water quality. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Low	2–7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
EC25	Construction of tunnels causes ground settlement that changes drainage flow and/or hydrology of wetlands.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure. EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	Low	8 + years	Minor	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure. EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	Low	7+ years	Minor	Unlikely	Low
EC26	Construction of tunnels causes ground settlement or tree root interactions causing death of native trees, degradation of vegetation quality or vitality of native vegetation.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Low	2-7 years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Low	2-7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk							
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect							
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
Greenhouse Gas Impact Assessment																
GH01	Land clearing and consumption of materials and electricity generated from fossil fuels, operation of plant and equipment, and transportation of materials and equipment during construction result in the release of greenhouse gas emissions which could contribute to global climate change.	EPR SCC1 – Implement a Sustainability Management Plan. EPR SCC2 – Minimise greenhouse gas emissions.	Wider region	Medium	2–7 years	Major	Planned	Planned	EPR SCC1 – Implement a Sustainability Management Plan. EPR SCC2 – Minimise greenhouse gas emissions.	Wider region	Medium	2–7 years	Major	Planned	Planned	
Ground Movement																
GM01	Upgrade works to M80 Ring Road pavement/subgrade cause ground movements that lead to damage to the Maroondah aqueduct.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Possible	Medium	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Rare	Low	
GM02	Open cut and cut-and-cover excavations between Watsonia Station and Lower Plenty Road causing ground movement leading to damage to nearby residential properties, infrastructure and utilities adjacent to Greensborough Road.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	low	3 months to 2 years	Minor	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Rare	Very low	
GM03	Construction of the northern portal (TBM) temporary retention structures causing ground movement leading to damage to adjacent residential properties (and minor utilities).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Rare	Very low	

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
GM04	Construction of the trench south of Yallambie Road causing ground movement leading to damage to Buildings in Simpson Barracks.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Possible	Medium	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	low	3 months to 2 years	Minor	Possible	Low
GM05	TBM tunnelling between Lower Plenty Road and Banyule Flats may cause ground movement leading to damage to residential, sensitive or heritage buildings (for example Banyule Homestead, Viewbank house, Goodstart Early Learning).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Municipality	Low	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Rare	Very low
GM06	TBM tunnelling between Banyule Flats and Banksia Street portal causing ground movement leading to damage to residential, sensitive or heritage buildings (Eg Banyule flats, Heide Sculpture Park).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Rare	Very low
GM07	TBM tunnelling between northern edge of Banyule Flats and Banksia Street portal causing localised heave or settlement leading to permanent visible changes to landforms.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Medium	0–3 months	Minor	Possible	Low	None.	Corridor	Very low	3 months to 2 years	Minor	Rare	Very low
GM09	Groundwater drawdown associated with temporary dewatering of Manningham Road Interchange excavations may cause drawdown settlement related ground movements, adversely affecting parklands and landscape areas including Bolin Bolin Billabong and Manningham Interchange slope.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	2–7 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Low	2–7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
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			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
GM10	Groundwater "mounding" associated with Manningham Road Interchange retention structures may cause swelling or compaction related ground movements, adversely affecting adjacent utilities, Bulleen Rd, commercial and residential buildings	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	2–7 years	Minor	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment.	Local	Very low	2–7 years	Negligible	Possible	Low
GM11	Sequential Excavation Method (SEM) mined tunnelling beneath the area between Bulleen Road and Rocklea Road, causing ground movement leading to damage to adjacent utilities, Bulleen Rd, and residential buildings.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Unlikely	Low
GM12	Sequential Excavation Method (SEM) mined tunnels may cause unacceptable strains on Historic Clarendon Eyre House (6 Robb Close) if variable ground conditions (deep weathering, paleo-channel deposits) are encountered.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low	None.	Local	Very low	3 months to 2 years	Negligible	Rare	Very low
GM13	Construction of the cut-and-cover/retained excavations south of Rocklea Road causing ground movement leading to damage to adjacent residential properties and minor utilities.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
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GM14	Construction of the cut-and-cover/retained excavations south of Rocklea Rd causing ground movement leading to damage to the Veneto Club and the Bolin Swamp Integrated Water Facility.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low
GM16	Eastern Freeway upgrade works parallel to/and above the Koonung Creek Culvert causing ground movements leading to damage of the concrete (BEBO) arch Structure.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Municipality	Medium	2-7 years	Moderate	Possible	Medium	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Corridor	Medium	2-7 years	Moderate	Unlikely	Low
GM17	Trenched excavations and de-watering associated with the Bulleen Road cut and cover section as well as pipe jacking associated with the Bulleen Road sewer diversion works causing ground movement leading to permanent surface settlement/depressions and water ponding in playing fields.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Very low	3 months to 2 years	Negligible	Possible	Low	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Unlikely	Low
GM18	Pipe-jacking for sewer diversion works in shallow cover beneath Trinity Grammar Sporting Complex causing ground movement leading to localised "sinkholes" or surface "blowout" and damage to fields.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
GM19	Tunnelling between Lower Plenty Road and edge of Banyule Flats may cause ground movement leading to Damage to Banyule Creek sewer.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Very low	3 months to 2 years	Negligible	Possible	Low
GM20	Tunnelling beneath Banksia Park at Banksia St portal in addition to the Manningham Interchange cut-and-cover excavation may cause ground movement leading to damage to 'Helmet', a sculptural installation owned by Manningham City Council.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Likely	Medium	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure. EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	Medium	3 months to 2 years	Minor	Likely	Medium
GM21	Tunnelling beneath Banksia Park at Banksia St portal in addition to the cut-and-cover excavation may cause ground movement leading to damage to "Journey's End" Heritage building (and adjacent property).	GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Rare	Very low	None	Local	Very low	0–3 months	Negligible	Rare	Very low
GM22	Upgrade works to Eastern Freeway pavement/subgrade causes ground movements that leads to damage to the 1.15 metre diameter pipeline near Kenneth Street (Kenneth Street water main).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Unlikely	Low	None	Local	Medium	3 months to 2 years	Minor	Rare	Very low
GM23	Construction of the road embankment between Bulleen Oval and the Eastern Freeway causes ground movement leading to damage to the 2.25 metre diameter North Yarra Main Branch sewers (Bullen Road west sewer).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Possible	Medium	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	High	3 months to 2 years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
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GM24	Upgrade works to Greensborough Road causing ground movements that lead to damage to the Dandenong – Melbourne ring main (Elder Street gas main).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Medium	3 months to 2 years	Minor	Rare	Very low
GM25	Tunnelling beneath Banyule Flats may cause ground movement leading to damage to parklands and landscape areas, including the Banyule Swamp.	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure. EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	Medium	7+ years	Moderate	Rare	Low
GM26	Lower Plenty Rd water mains (conceptual re-alignment) adversely affected by the TBM launch/reception in potentially faulted ground (high VL %).	EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	High	3 months to 2 years	Moderate	Likely	Medium	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure. EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	High	3 months to 2 years	Moderate	Rare	Low
GM27	Excavation of TBM retrieval shafts at the southern end of the TBM tunnels adversely impacting residential properties on Bridge Street.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure.	Local	Low	3 months to 2 years	Minor	Unlikely	Low

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Groundwater																
GW01	Construction activities that result in the degradation of groundwater quality via spills, storage and handling of hazardous materials, eg fuels.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR CL 5 – Manage chemicals, fuels and hazardous materials. EPR GW2 – Monitor groundwater. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR CL 5 – Manage chemicals, fuels and hazardous materials. EPR GW2 – Monitor groundwater. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low	
GW02	Construction activities including dewatering (or extraction of groundwater for construction water supply) result in loss of operational capacity of existing, registered, groundwater users.	EPR SCC4 – Minimise potable water consumption. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Low	3 months to 2 years	Minor	Unlikely	Low	EPR SCC4 – Minimise potable water consumption. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Low	3 months to 2 years	Minor	Unlikely	Low	
GW03	Construction activities including dewatering (and water supply) result in a water level drawdown of a magnitude in areas having in situ sulfidic sediments or rock that results in generation of acidic groundwater conditions.	EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Low	3 months to 2 years	Minor	Possible	Low	EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Low	3 months to 2 years	Minor	Possible	Low	

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
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			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
GW04	Construction activities including dewatering (or extraction of groundwater for construction water supply) result in the dislocation of delineated, contaminated groundwater plumes.	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low
GW05	Management of groundwater seepage into construction excavations results in unacceptable impacts at the point of discharge.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Local	Medium	3 months to 2 years	Minor	Possible	Low
Human Health															
HE01	Noise and vibration emissions from construction activities affecting the health of the local community.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Corridor	Medium	3 months to 2 years	Moderate	Possible	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Corridor	Low	3 months to 2 years	Minor	Possible	Low
HE02	Dust generated and emissions to air from construction equipment and construction activities affecting the health of local community.	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR SC2 – Implement a Communications and Community Engagement Plan.	Local	Medium	3 months to 2 years	Minor	Possible	Low	EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR SC2 – Implement a Communications and Community Engagement Plan.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low

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			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
HE03	Inappropriate handling, stockpiling, transport and treatment/disposal of contaminated soil resulting in exposure and potential health impacts to the local community.	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR CL2 Minimise impacts from disturbance of acid sulfate soil.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low
HE05	Changes within the community such as the altered access or connectivity to/between recreational areas, community facilities, commercial premises and active transport infrastructure resulting in potential implications to public safety and wellbeing of individuals during construction.	EPR B4 – Minimise access and amenity impacts on businesses during construction EPR SC2 – Implement a Communications and Community Engagement Plan EPR T2 – Transport Management Plan(s) (TMP).	Local	Low	2–7 years	Minor	Likely	Medium	EPR B4 – Minimise access and amenity impacts on businesses during construction. EPR SC2 – Implement a Communications and Community Engagement Plan.	Local	Low	2–7 years	Minor	Possible	Low
HE06	Changes within the community from the temporary use of some green space areas for construction resulting in impacts on the health and wellbeing of the community and permanent loss of some green space during operation.	EPR SC4 – Minimise impacts on sporting, recreation and other facilities. EPR LV2 – Minimise landscape impacts during construction.	Local	Low	2–7 years	Minor	Likely	Medium	EPR SC4 – Minimise impacts on sporting, recreation and other facilities. EPR LV2 – Minimise landscape impacts during construction.	Local	Low	2–7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
Historical Heritage															
HH01	Construction works and permanent infrastructure have a direct physical and/or visual impact on VHR-listed places of state significance with an adverse impact on heritage values.	EPR HH1 – Design and construct to minimise impacts on heritage. EPR AR1 – Maximise retention of trees. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Low	7+ years	Minor	Likely	Medium	Banyule Homestead: Refer to GM and NV EPRs. Heide I and II: Refer to GM and NV EPRs, see also HH5. Fairlea Womens Prison EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values.	Local	Low	7+ years	Minor	Likely	Medium
HH02	Construction works and permanent infrastructure have a direct physical and/or visual impact on heritage places listed in the planning schemes with an adverse impact on heritage values.	EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH4 – Undertake archival photographic recording. EPR AR1 – Maximise retention of trees. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	High	7+ years	Major	Planned	Planned	Journeys End and Bridge Street Pine and Cypress Plantings EPR HH1 – Design and construct to minimise impacts on heritage. EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. EPR AR3 – Implement a Tree Canopy Replacement Plan. River Red Gum EPR HH4 – Undertake archival photographic recording. Yarra River Protectorate Station site EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values. EPR AH1 – Comply with the Cultural Heritage Management Plan. English Oak EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained. Archaeological site, Wetherby Road, Doncaster EPR AH1 – Comply with the Cultural Heritage Management Plan.	Local	High	7+ years	Major	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Risk level	Final EPR	Magnitude of effect					Risk level
			Extent	Severity	Duration	Overall consequence	Likelihood			Extent	Severity	Duration	Overall consequence	Likelihood	
HH03	Construction works and permanent infrastructure have a direct physical and/or visual impact on places of potential heritage significance but with no statutory controls with an adverse impact on heritage values.	EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH4 – Undertake archival photographic recording.	Local	Medium	7+ years	Moderate	Planned	Planned	Simpson Barracks EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH4 – Undertake archival photographic recording. Veneto Club EPR AR3 – Implement a Tree Canopy Replacement Plan. Eastern Freeway Stage 1 EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH4 – Undertake archival photographic recording. EPR AR1 – Maximise retention of trees. EPR AR3 – Implement a Tree Canopy Replacement Plan. EPR LV1 Design to be generally in accordance with the Urban Design Strategy Yarra River and Environs: EPR AH1 – Comply with the Cultural Heritage Management Plan. EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values. EPR AR1 – Maximise retention of trees. EPR AR3 – Implement a Tree Canopy Replacement Plan. EPR GW2 – Monitor groundwater. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception. EPR SW4 – Monitor water quality. EPR CL2 – Minimise impacts from disturbance of acid sulfate soil. EPR FF2 – Minimise and offset native vegetation removal. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	7+ years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
									Yarrandoo Park windbreak planting EPR AR1 – Maximise retention of trees. EPR AR2 – Implement a Tree Protection Plan to protect trees to be retained.						
HH04	Construction work or the establishment of construction sites disturbs historical archaeological sites listed on the Victorian Heritage Inventory (eg Yarra Bend Park H7922-0142).	EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values.	Local	Low	7+ years	Minor	Planned	Planned	EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values.	Local	Low	7+ years	Minor	Planned	Planned
HH05	Construction works or the establishment of construction sites disturbs unidentified historical archaeological sites.	EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values.	Local	Low	7+ years	Minor	Possible	Low	EPR HH2 – Implement an Archaeological Management Plan to avoid and minimise impacts on historic archaeological sites and values.	Local	Low	7+ years	Minor	Possible	Low
HH06	Vibration or ground settlement as a result of construction works causes damage to significant buildings or structures.	EPR HH1 – Design and construct to minimise impacts on heritage. EPR HH3 – Monitor condition of heritage sites. Refer also to relevant NV and GM EPRs.	Local	Low	3 months to 2 years	Minor	Possible	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures. EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a Ground Movement Plan to manage ground movement impacts. EPR GM3 – Carry out Condition surveys for potentially affected property and infrastructure EPR GM4 – Rectify damage to properties and assets impacted by ground movement or settlement.	Local	Low	3 months to 2 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
HH07	(Construction) Changes to groundwater conditions including groundwater drawdown cause damage to significant trees and landscapes as part of heritage places.	EPR HH1 – Design and construct to minimise impacts on heritage. EPR AR1 – Maximise retention of trees. EPR AR3 – Implement a Tree Canopy Replacement Plan. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods.	Local	Medium	2–7 years	Moderate	Possible	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR FF2 – Minimise and offset native vegetation removal. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan. EPR GW2 – Monitor groundwater. EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception. EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Local	Medium	7+ years	Moderate	Possible	Medium
Land use planning															
LU01	Construction activities require permanent acquisition of residential properties, resulting in permanent change in land use.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR SC1 – Reduce Community Disruption.	Local	High	7+ years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR SC1 – Reduce Community Disruption EPR SC2 – Implement a Communications and Community Engagement Plan.	Local	High	7+ years	Moderate	Planned	Planned
LU02	Construction activities require permanent acquisition of open space and public conservation land uses, resulting in permanent change in land use.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR SC1 – Reduce Community Disruption.	Municipality	Medium	7+ years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR SC1 – Reduce Community Disruption EPR SC2 – Implement a Communications and Community Engagement Plan. EPR SC4 – Minimise impacts on sporting, recreation and other facilities.	Municipality	Medium	7+ years	Moderate	Planned	Planned
LU03	Construction activities require permanent acquisition of commercial and industrial land (eg Bulleen industrial precinct), resulting in permanent change to commercial and industrial land use.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR B1 – Business support.	Local	Medium	7+ years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	Medium	7+ years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU04	Construction activities require temporary occupation of open space resulting in a temporary change in land use.	EPR LP1 – Minimise design footprint.	Corridor	Medium	2–7 years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR SC1 – Reduce Community Disruption EPR SC2 – Implement a Communications and Community Engagement Plan. EPR SC4 – Minimise impacts on sporting, recreation and other facilities.	Corridor	Medium	2–7 years	Moderate	Planned	Planned
LU05	Construction activities require temporary occupation of education and community facilities resulting in a temporary change in land use.	EPR LP1 – Minimise design footprint.	Local	Medium	2–7 years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR SC1 – Reduce Community Disruption EPR SC2 – Implement a Communications and Community Engagement Plan. EPR SC4 – Minimise impacts on sporting, recreation and other facilities.	Local	Medium	2–7 years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU06	Construction activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of residential land.	<p>EPR LP1 – Minimise design footprint.</p> <p>EPR LP2 – Minimise impacts from location of new services and utilities.</p> <p>EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans, EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.</p> <p>EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.</p> <p>EPR NV8 – Minimise construction vibration impacts on amenity.</p> <p>EPR NV9 – Minimise construction vibration impacts on structures.</p> <p>EPR NV10 – Minimise impacts from ground-borne (internal) noise.</p> <p>EPR SC2 – Implement a Communications.</p> <p>EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.</p> <p>EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure.</p> <p>EPR LV1 Design to be generally in accordance with the Urban Design Strategy.</p> <p>EPR LV2 Minimise landscape impacts during construction.</p> <p>EPR LV3 Minimise construction lighting impacts.</p> <p>EPR T2 – Transport Management Plan(s) (TMP).</p>	Corridor	High	7+ years	Major	Possible	High	<p>EPR LP1 – Minimise design footprint.</p> <p>EPR LP2 – Minimise impacts from location of new services and utilities.</p> <p>EPR LP3 – Minimise inconsistency with strategic land use plans.</p> <p>EPR LP4 – Minimise overshadowing from noise walls and elevated structures.</p> <p>EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.</p> <p>EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.</p> <p>EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.</p> <p>EPR NV8 – Minimise construction vibration impacts on amenity.</p> <p>EPR NV9 – Minimise construction vibration impacts on structures.</p> <p>EPR NV10 – Minimise impacts from ground-borne (internal) noise.</p> <p>EPR NV13 – Noise Mitigation – noise walls.</p> <p>EPR SC2 – Implement a Communications.</p> <p>EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.</p> <p>EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure.</p> <p>EPR LV1 Design to be generally in accordance with the Urban Design Strategy.</p> <p>EPR LV2 – Minimise landscape impacts during construction.</p> <p>EPR LV3 – Minimise construction lighting impacts.</p> <p>EPR LV4 – Minimise operation lighting impacts.</p> <p>EPR T2 – Transport Management Plan(s) (TMP).</p>	Corridor	Medium	7+ years	Major	Unlikely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU07	Construction activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of open space and public conservation land.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans, EPR. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV9 – Minimise construction vibration impacts on structures. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 – Implement a Communications and Community Engagement Plan. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LV2 – Minimise landscape impacts during construction. EPR LV3 – Minimise construction lighting impacts. EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	7+ years	Major	Possible	High	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR LP4 – Minimise overshadowing from noise walls and elevated structures. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV9 – Minimise construction vibration impacts on structures. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR NV13 – Noise Mitigation – noise walls. EPR SC2 – Implement a Communications and Community Engagement Plan. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LV2 – Minimise landscape impacts during construction. EPR LV3 – Minimise construction lighting impacts. EPR LV4 – Minimise operation lighting impacts. EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU08	Construction activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of education and community facility land.	<p>EPR LP1 – Minimise design footprint.</p> <p>EPR LP2 – Minimise impacts from location of new services and utilities.</p> <p>EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans, EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.</p> <p>EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.</p> <p>EPR NV8 – Minimise construction vibration impacts on amenity.</p> <p>EPR NV9 – Minimise construction vibration impacts on structures.</p> <p>EPR NV10 – Minimise impacts from ground-borne (internal) noise.</p> <p>EPR SC2 – Implement a Communications and Community Engagement Plan.</p> <p>EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.</p> <p>EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure.</p> <p>EPR LV1 Design to be generally in accordance with the Urban Design Strategy.</p> <p>EPR LV2 – Minimise landscape impacts during construction.</p> <p>EPR LV3 – Minimise construction lighting impacts.</p> <p>EPR T2 – Transport Management Plan(s) (TMP).</p>	Municipality	High	7+ years	Major	Possible	High	<p>EPR LP1 – Minimise design footprint.</p> <p>EPR LP2 – Minimise impacts from location of new services and utilities.</p> <p>EPR LP4 – Minimise overshadowing from noise walls and elevated structures.</p> <p>EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.</p> <p>EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.</p> <p>EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.</p> <p>EPR NV8 – Minimise construction vibration impacts on amenity.</p> <p>EPR NV9 – Minimise construction vibration impacts on structures.</p> <p>EPR NV10 – Minimise impacts from ground-borne (internal) noise.</p> <p>EPR NV13 – Noise Mitigation – noise walls.</p> <p>EPR SC2 – Implement a Communications and Community Engagement Plan.</p> <p>EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.</p> <p>EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure</p> <p>EPR LV1 Design to be generally in accordance with the Urban Design Strategy.</p> <p>EPR LV2 – Minimise landscape impacts during construction.</p> <p>EPR LV3 – Minimise construction lighting impacts.</p> <p>EPR LV4 – Minimise operation lighting impacts.</p> <p>EPR T2 – Transport Management Plan(s) (TMP).</p>	Municipality	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU09	Construction activities require permanent acquisition of residential properties, resulting in permanent changes to residential land use character.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities.	Local	High	7+ years	Major	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities, EPR LP3 – Minimise inconsistency with strategic land use plans. EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Local	Medium	7+ years	Moderate	Planned	Planned
LU10	Construction activities require permanent acquisition of open space and public conservation land uses, resulting in permanent change in open space and public conservation land use character.	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from.	Municipality	Medium	7+ years	Moderate	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP2 – Minimise impacts from location of new services and utilities. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Municipality	Medium	7+ years	Moderate	Planned	Planned
LU11	Land use changes brought by the project may result in inconsistencies with planning policies and strategic plans.	EPR LP1 – Minimise design footprint. EPR SC1 – Reduce Community Disruption. EPR B1 – Business support.	Local	High	7+ years	Major	Planned	Planned	EPR LP1 – Minimise design footprint. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR SC1 – Reduce Community Disruption EPR SC2 – Implement a Communications and Community Engagement Plan. EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Local	High	7+ years	Major	Planned	Planned
Landscapes and Visual															
LV01	Construction laydown, materials storage and stockpiling causes adverse impacts to views experienced from within parklands and recreation, urban forest, mixed use activity centre, suburban residential and road corridor character areas.	EPR LV2 – Minimise landscape impacts during construction. EPR LV3 – Minimise construction lighting impacts.	Local	High	2–7 years	Moderate	Planned	Planned	EPR LV2 – Minimise landscape impacts during construction. EPR LV3 – Minimise construction lighting impacts.	Local	High	2–7 years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk							
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect							
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
Surface Noise Vibration																
SNV01	Noise generated by surface works during construction (including transport of spoil) causes an increase in noise or vibration affecting amenity at sensitive receivers.	EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors..	Corridor	High	3 months to 2 years	Major	Likely	High.	EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR NV3 – Minimise construction noise impacts to sensitive receptors.	Corridor	Medium	3 months to 2 years	Minor	Possible	Medium	
SNV02	Mitigation measures required to mitigate surface works during construction are not feasible, reasonable or practical.	EPR NV4 –Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Corridor	Medium	3 months to 2 years	Moderate	Possible	Medium	EPR NV4 –Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Local	Medium	3 months to 2 years	Minor	Unlikely	Low	
SNV03	Human impact vibration (VDV) resulting by surface works during construction (including transport of spoil) causes loss of amenity at sensitive receivers.	EPR NV4 –Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity.	Municipality	Medium	3 months to 2 years	Moderate	Likely	Medium	EPR NV4 –Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity.	Local	Medium	3 months to 2 years	Minor	Possible	Low	
SNV04	Structural damage to buildings resulting by surface works during construction (including transport of spoil) causes damage to structures.	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	Very High	3 months to 2 years	Major	Unlikely	Medium	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	3 months to 2 years	Moderate	Rare	Low	
SNV05	Vibration to sensitive scientific equipment from construction works.	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV13 – Noise Mitigation – noise walls.	Local	High	3 months to 2 years	Moderate	Rare	Low	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV13 – Noise Mitigation – noise walls.	Local	Medium	3 months to 2 years	Moderate	Rare	Low	
SNV06	Vibration damage to underground services from construction vibration works.	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV5 – Establish vibration guidelines to protect utility assets.	Corridor	High	3 months to 2 years	Major	Unlikely	Medium	EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV5 – Establish vibration guidelines to protect utility assets.	Local	Medium	3 months to 2 years	Moderate	Rare	Low	

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
Social															
SO01	Acquisition of residential properties leading to relocation of residents from existing place of residence and neighbourhood that may disrupt established social networks, and residents would have to re-establish and adapt to a different place of residence.		Corridor	Medium	3 months to 2 years	Moderate	Almost certain	High	EPR LP1 – Minimise design footprint. EPR SC1 – Reduce community disruption.	Corridor	Low	3 months to 2 years	Minor	Almost certain	Medium
SO02	Acquisition of residential properties causes social isolation and increase vulnerability if people have to move out of the area due to unaffordability or unavailability of properties to buy within the same area.		Corridor	Medium	3 months to 2 years	Moderate	Possible	Medium	EPR SC1 – Reduce community disruption.	Corridor	Low	3 months to 2 years	Minor	Possible	Low
SO03	Construction and location of infrastructure closer to private residential properties leading to changes to amenity and lifestyle.		Corridor	Medium	3 months to 2 years	Moderate	Likely	Medium	EPR SC1 – Reduce community disruption EPR SC2 – Implement a Communications and Community Engagement Plan.	Corridor	High	3 months to 2 years	Moderate	Possible	Medium
SO04	Construction and location of infrastructure such as ramps near or surrounding residential communities leads to a sense of loss of connectivity and access to other areas.		Local	Very low	7+ years	Minor	Unlikely	Low	EPR SC1 – Reduce community disruption.	Local	Very low	7+ years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SO05	Noise, air emissions and visual changes including overshadowing generated due to construction activities, construction traffic and redistribution of traffic, affect the amenity of the nearby residents and reduce the overall liveability and attractiveness of the area causing inconvenience, changes to lifestyle, disruption to daily life and activities.	Noise, Air and Visual EPRs.	Corridor	Medium	2-7 years	Major	Likely	High	<p>Noise</p> <p>EPR NV3 – Minimise construction noise impacts to sensitive receptors.</p> <p>EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.</p> <p>EPR NV8 – Minimise construction vibration impacts on amenity.</p> <p>EPR NV9 – Minimise construction vibration impacts on structures.</p> <p>EPR NV10 – Minimise impacts from ground-borne (internal) noise</p> <p>NV11.</p> <p>Air and contaminated land</p> <p>EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction.</p> <p>EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements</p> <p>EPR CL3 – Minimise odour impacts during spoil management)</p> <p>Landscape and Visual EPRs</p> <p>EPR LV1 Design to be generally in accordance with the Urban Design.</p> <p>Strategy</p> <p>EPR LV2 – Minimise landscape impacts during construction.</p> <p>EPR LV3 – Minimise construction lighting impacts.</p> <p>EPR SC3 Participate in the Community Liaison Group.</p>	Corridor	Medium	2-7 years	Moderate	Possible	Medium
SO06	Changes to traffic conditions during construction such as road, lane, or shared path closures and detours may cause safety concerns, disruption to access areas and properties, increase travel time, cause delays and inconvenience for road users.		Corridor	Medium	2-7 years	Moderate	Likely	Medium	<p>Traffic EPRs</p> <p>EPR T2 – Transport Management Plan(s) (TMP).</p> <p>EPR T3 – Transport Management Liaison Group).</p> <p>EPR SC3 Participate in the Community Liaison Group.</p>	Corridor	Medium	2-7 years	Moderate	Likely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SO07	Changes to traffic conditions during construction such as road, lane, or shared path closures and detours impacting on the vulnerable population such as the elderly, those that use mobility aid (wheelchairs) by reducing travel accessibility, causing isolation, deterioration of mental and physical health.	Traffic EPRs.	Corridor	Medium	2-7 years	Moderate	Likely	Medium	Traffic EPRs EPR T2 – Transport Management Plan(s) (TMP). EPR T3 – Transport Management Liaison Group. EPR T4 – Road safety design. EPR SC3 – Participate in the Community Liaison Group.	Local	Medium	2-7 years	Moderate	Likely	Medium
SO08	Full or partial land acquisition of sporting and recreational facilities reduces the function and viability of the facility and in turn reduces opportunities for an active lifestyle and impacts on social networks that people create through participation in sporting and recreational activities.		Wider Region	High	2-7 years	Major	Possible	High.	EPR SC4 – Minimise impacts on sporting, recreation and other facilities.	Wider Region	Low	3 months to 2 years	Moderate	Unlikely	Low
SO09	Noise, air emissions and visual changes including overshadowing generated during construction reduces the overall amenity of community infrastructure facilities, leading to reduce enjoyment of the facility and impacting on the function and viability of the place.	Noise, Air and Landscape and Visual EPRs.	Corridor	High	2-7 years	Major	Possible	High.	Noise, Air and Landscape and Visual EPRs EPR SC3 – Participate in the Community Liaison Group.	Corridor	Low	2-7 years	Moderate	Likely	Medium
SO10	Disruption to and change in public transport services may lead to users having to change their travel routes and adapt to temporary relocation of bus stops and bus and train routes.		Corridor	Medium	3 months to 2 years	Moderate	Almost certain	High.	Traffic EPRs EPR T2 – Transport Management Plan(s) (TMP). EPR T3 – Transport Management Liaison Group. EPR SC2 – Implement a Communications and Community Engagement Plan.	Corridor	Low	3 months to 2 years	Minor	Likely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SO11	Acquisition of commercial properties increases unemployment in the local area, as some people may choose to quit their jobs as the commercial operations relocate to another area.	Business EPRs.	Municipality	Medium	3 months to 2 years	Moderate	Likely	Medium	Business EPRs EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Municipality	Low	3 months to 2 years	Moderate	Possible	Medium
SO12	Acquisition of commercial properties would lead to relocation of businesses or closure of businesses leading to disruption or breakdown in the social networks created by the businesses owners and staff in the area.	Business EPRs.	Municipality	High	7+ years	Major	Possible	High.	Business EPRs EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Municipality	Low	3 months to 2 years	Moderate	Possible	Medium
SO13	Relocation of businesses would diminish access to those goods and services for the surrounding community	Business EPRs.	Municipality	Low	2–7 years	Minor	Likely	Medium	Business EPRs EPR B1 – Business support. EPR B2 – Minimise disruption to businesses from land acquisition and temporary occupation.	Municipality	Very low	0–3 months	Minor	Possible	Low
Surface water															
SW01	Construction activities causing an increase in flood frequency, velocity or level which affects users or assets within the floodplain.	EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications.	local	High	2–7 years	Moderate	Possible	Medium	EPR SW5 – Implement a surface water management plan during construction. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities, EPR SW8 – Minimise impacts from waterway modifications.	local	High	2–7 years	Moderate	Possible	Medium
SW02	Construction activities on existing flow paths including piped flow, causing a change in flow to downstream water quality assets impacting on the performance of the asset.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction – Implement a surface water management plan during construction.	Municipality	Low	2–7 years	Minor	Unlikely	Low	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction.	Municipality	Low	2–7 years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SW03	Construction activities causing unintended damage to drainage assets resulting in an unacceptable increase in flooding risk.	EPR SW5 – Implement a surface water management plan during construction – Implement a surface water management plan during construction. EPR SW10 – Provide for access to Melbourne Water and other drainage assets. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure	Local	Medium	2-7 years	Moderate	Possible	Medium	EPR SW5 – Implement a surface water management plan during construction. EPR SW10 – Provide for access to Melbourne Water and other drainage assets. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure	Local	Medium	2-7 years	Moderate	Possible	Medium
SW04	Construction activities resulting in bed or bank erosion causing instability of assets adjacent to the waterway.	EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW10 – Provide for access to Melbourne Water and other drainage assets.	local	High	2-7 years	Moderate	Likely	Medium	EPR SW5 – Implement a surface water management plan during construction. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW10 – Provide for access to Melbourne Water and other drainage assets.	local	Medium	2-7 years	Moderate	Likely	Medium
SW05	Construction activities resulting in bed or bank erosion impacting on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability. EPR SW10 – Provide for access to Melbourne Water and other drainage assets.	Wider region	Medium	2-7 years	Major	Unlikely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction. EPR SW9 – Maintain bank stability. EPR SW10 – Provide for access to Melbourne Water and other drainage assets.	Wider region	Medium	2-7 years	Major	Unlikely	Medium
SW06	Hazardous materials during construction of the project being released into the waterways resulting in adverse impacts on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction.	Wider region	High	2-7 years	Major	Unlikely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction	Wider region	High	2-7 years	Major	Unlikely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SW07	Construction activities causing sediment or contaminants to be released into the waterways resulting in adverse impacts on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction.	Wider region	High	2–7 years	Major	Unlikely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW4 – Monitor water quality. EPR SW5 – Implement a surface water management plan during construction.	Wider region	High	2–7 years	Major	Unlikely	Medium
SW08	Construction activities leading to changes to water storages or supplies of irrigation assets affecting user.	N/A.	local	Low	2–7 years	Minor	Likely	Medium	EPR SW12 – Minimise impacts on irrigation of sporting fields.	local	Low	2–7 years	Minor	Unlikely	Low
Transport															
TR01	Traffic movements associated with construction site clearance and establishment impedes the safe and efficient movement of local traffic, including PT movements and cyclists and pedestrians.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	3 Months to 2 years	Moderate	Possible	Medium	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	3 Months to 2 years	Moderate	Possible	Medium
TR02	Traffic movements associated with construction activity impedes the safe and efficient movement of freeway traffic, including the disruption associated with the potential closure of traffic lanes.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	High	2–7 years	Major	Possible	High	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium
TR03	Normal traffic flows on the freeway are impeded by narrowing of traffic lanes to accommodate construction activity and by driver behaviour around construction activity within the freeway.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
TR04	Public transport impeded by traffic movements associated with construction of surface roads and other civil infrastructure works, including potential temporary closures of bus routes and rail lines, and incidental damage to PT infrastructure.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	High	2–7 years	Major	Possible	High	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium
TR05	Cyclists and pedestrians impeded by traffic movements and activities associated with construction of surface roads and other civil infrastructure works.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Unlikely	Low	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Unlikely	Low
TR06	Traffic movements associated with construction activity impede freight accessibility and increase travel times for freight traffic generally.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium
TR07	Traffic movements associated with construction activity affect access and egress to industrial and commercial premises through increased congestion and temporary road closures.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Unlikely	Low	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Unlikely	Low
TR08	Traffic movements associated with construction activity affect access and egress to recreational facilities and public open space through increased congestion and temporary road closures.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Possible	Low	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Risk level	Final EPR	Magnitude of effect					Risk level
			Extent	Severity	Duration	Overall consequence	Likelihood			Extent	Severity	Duration	Overall consequence	Likelihood	
TR09	Traffic movements associated with construction activity on the freeways generate additional traffic and congestion of the surrounding road network through road users seeking diversions around the freeways.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Likely	Medium	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Likely	Medium
TR10	Traffic associated with the construction of the ramp connections to the Eastern Freeway impedes the safe and efficient movement of traffic, including PT movements, on the Eastern Freeway through temporary lane closures.	EPR T2 – Transport Management Plan(s) (TMP).	Local	High	2–7 years	Moderate	Possible	Medium	EPR T2 – Transport Management Plan(s) (TMP).	Local	High	2–7 years	Moderate	Possible	Medium
TR11	Construction works associated with the ramp connections to the Eastern Freeway results in temporary closure or diversion of pedestrian and bicycle paths, due to proximity to construction activities.	EPR T2 – Transport Management Plan(s) (TMP).	Local	Medium	2–7 years	Negligible	Unlikely	Low	EPR T2 – Transport Management Plan(s) (TMP).	Local	Medium	2–7 years	Negligible	Unlikely	Low
TR12	Construction traffic associated with the removal of spoil generated by tunnelling or trenching activities impedes the safe and efficient movement of traffic and PT movements on arterial and local roads in the vicinity of the work zones.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	High	2–7 years	Major	Possible	High	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Medium	2–7 years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
TR13	Construction traffic associated with the removal of spoil generated by tunnelling or trenching activities impedes safe and efficient pedestrian and bicycle movement on arterial and local roads, including dedicated pedestrian and bicycle paths in the vicinity of the work zones.	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Possible	Low	EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Very low	2–7 years	Minor	Possible	Low
Tunnel Vibration															
TV01	The level of vibration from the equipment cannot be lowered to meet the criteria at the residential properties along the alignment and causes loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	High	0–3 months	Moderate	Possible	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low
TV02	The level of regenerated noise from the equipment cannot be lowered to meet the criteria at the residential properties along the alignment and causes loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	High	0–3 months	Moderate	Possible	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
TV03	Residents along the alignment are more sensitive to the vibration and regenerated noise impacts and are affected by levels less than guideline values.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Almost certain	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Likely	Low
TV04	The levels of vibration are elevated at some residential properties as a consequence of unforeseen geology, water conditions, surface conditions and so on and cause loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Almost certain	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Almost certain	Low
TV05	The levels of regenerated noise are elevated at some residential properties as a consequence of unforeseen geology, water conditions, surface conditions and so on and cause loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Almost certain	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Almost certain	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
TV06	The rock type is more competent than originally assessed and requires alternative and more energetic equipment types which results in elevated vibration levels that exceed acceptable values.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Possible	Low
TV07	The rock type is more competent than originally assessed and requires alternative and more energetic equipment types which results in elevated regenerated noise levels at the residential properties exceed acceptable values.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Low	0–3 months	Negligible	Possible	Low
TV08	An accelerated construction schedule results in elevated vibration levels at the residential properties along the alignment and a loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
TV09	An accelerated construction schedule results in elevated regenerated noise levels at the residential properties along the alignment and a loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low
TV10	The production rates are reduced leading to a greater impact on residents in terms of amplitude and duration to which they are exposed to elevated levels of impact.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors.. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low
TV11	The construction of the buildings amplifies vibration levels and results in non-compliant levels and associated loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
TV12	The construction of the building and the internal finishing amplifies regenerated noise levels and results in non-compliant values and associated loss of amenity.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Likely	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	Medium	0–3 months	Minor	Possible	Low
TV13	Commercial buildings may contain sensitive equipment which cannot operate effectively with the generated levels of vibration and regenerated noise.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	High	0–3 months	Moderate	Possible	Medium	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV8 – Minimise construction vibration impacts on amenity. EPR NV10 – Minimise impacts from ground-borne (internal) noise. EPR SC2 Communications and community engagement plan.	Local	High	0–3 months	Moderate	Unlikely	Low
TV14	Infrastructure like retaining walls, services, tower piers and abutments are damaged by the vibration generated by the construction activities.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	0–3 months	Moderate	Unlikely	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	0–3 months	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
TV15	Either residential or commercial buildings along the corridor are structurally less sound than identified in the existing conditions assessment and are damaged by the level of vibration from the construction activities.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 Construction noise and vibration management plan (CNVMP). EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	0–3 months	Moderate	Unlikely	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 Construction noise and vibration management plan (CNVMP). EPR NV9 – Minimise construction vibration impacts on structures.	Local	Medium	0–3 months	Minor	Unlikely	Low
TV16	The ground mass properties beneath the dwellings along the corridor are affected by the low amplitude vibrations that results in settlement and damage to the residential or commercial buildings.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Local	High	3 months to 2 years	Moderate	Unlikely	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts.	Local	High	3 months to 2 years	Moderate	Unlikely	Low
TV17	Heritage buildings are damaged by the vibration generated by the construction methods.	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	0–3 months	Moderate	Unlikely	Low	EPR NV3 – Minimise construction noise impacts to sensitive receptors. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	0–3 months	Moderate	Unlikely	Low
TV18	Rock mass sufficiently competent that excavation of the cross passages or the northern dive structure development requires blasting that impacts on the amenity of persons.	Review of modelled data against the AS2436 (2010) and AS2187.2.	Local	Medium	0–3 months	Moderate	Possible	Medium	EPR NV11 Minimise amenity impacts from blast vibration. EPR NV12 Minimise amenity impacts from blast overpressure.	Local	Medium	0–3 months	Moderate	Unlikely	Low
TV19	Rock mass sufficiently competent that excavation of the cross passages or the northern dive structure development requires blasting that causes damage to the adjacent properties or other infrastructure.		Local	Medium	0–3 months	Moderate	Possible	Medium	EPR NV11 Minimise amenity impacts from blast vibration. EPR NV12 Minimise amenity impacts from blast overpressure.	Local	Medium	0–3 months	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
TV20	Construction activities induce vibration levels which could impact upon the integrity and serviceability of existing services.	Review modelled vibration against EPR NV5 – Establish vibration guidelines to protect utility assets.	Local	Medium	0–3 months	Moderate	Possible	Medium	EPR NV5 – Establish vibration guidelines to protect utility assets.	Local	Medium	0–3 months	Moderate	Unlikely	Low

A.2 Operation risks

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Final EPR	Residual Risk					
			Magnitude of effect							Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Aboriginal cultural heritage (no operational risks)															
Air Quality															
AQ14	Eastern Freeway and North East Link operation: Adverse impact on sensitive receptors from air quality changes associated with operation and maintenance of project (taking into account ventilation system and surface road emissions) and compared to no project situation, based on traffic volume projections.	EPR AQ4 Monitor ambient air quality.	Corridor	Low	7+ years	Moderate	Unlikely	Low	EPR AQ4 Monitor ambient air quality.	Corridor	Low	7+ years	Moderate	Unlikely	Low
AQ15	Eastern Freeway and North East Link operation: Underestimation of traffic volumes resulting in higher than anticipated ambient air quality impacts on sensitive receptors.	EPR AQ4 Monitor ambient air quality.	Corridor	Low	7+ years	Moderate	Possible	Medium	EPR AQ4 Monitor ambient air quality.	Corridor	Low	7+ years	Moderate	Possible	Medium
AQ16	Tunnel operations: Impact on sensitive receptors due to NO ₂ , PM ₁₀ and PM _{2.5} emissions to air from the tunnel portals and ventilation structures.	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Very low	7+ years	Minor	Unlikely	Low	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ4 Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Very low	7+ years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
AQ17	Tunnel operations: Impact on sensitive receptors due to emissions to air of pollutants other than NO ₂ , PM ₁₀ and PM _{2.5} emissions to air from the tunnel portals and ventilation structures.	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ4 Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Very low	7+ years	Minor	Unlikely	Low	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ4 Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Very low	7+ years	Minor	Unlikely	Low
AQ18	Tunnel operations: Potential impact on road users due to in-tunnel air quality.	EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	7+ years	Moderate	Unlikely	Low
AQ19	Tunnel operations: Underestimation of traffic volumes resulting in higher than anticipated ambient air quality impacts on road tunnel users and sensitive receptors.	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ3 Achieve in-tunnel air quality performance standards. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ3 Achieve in-tunnel air quality performance standards. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Local	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Arboriculture															
AR04	North East Link roads, bridges, tunnels and associated infrastructure would prevent the re-establishment of urban forest canopy within the vicinity of the project.	EPR AR3 – Implement a Tree Canopy Replacement Plan.	Corridor	High	7+ years	Major	Likely	High	EPR AR3 – Implement a Tree Canopy Replacement Plan.	Corridor	Low	7+ years	Moderate	Possible	Medium
AR05	Modification to growing conditions by new structures, such as shading of new trees, wind modification and drawdown of groundwater resulting in poor growing conditions and reduction of urban forest canopy cover.	EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Low	7+ years	Minor	Unlikely	low	EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Low	7+ years	Minor	Unlikely	Low
Business															
BU13	Noise and amenity impacts resulting from redistribution of traffic due to operation of North East Link may reduce the viability of businesses and commercial facilities whose operation is sensitive to noise and amenity impacts.	Noise and vibration EPRs – Ensure noise and amenity impacts are minimised eg through project design and noise attenuating structures.	Corridor	Low	7+ years	Moderate	Possible	Medium	EPR B4 – Minimise access and amenity impacts on businesses. Noise and vibration EPRs EPR NV1. EPR NV2. Air quality EPR EPR AQ2. EPR AQ4.	Corridor	Very low	7+ years	Minor	Unlikely	Low
BU14	Business operational costs increase due to suppliers passing on the cost of North East Link tolls to access the business.	EPR B1 – Business support.	Wider region	Very low	7+ years	Minor	Likely	Medium	Traffic EPRs EPR T1 Optimise design performance and EPR T5 – Traffic monitoring.	Wider region	Very low	7+ years	Minor	Unlikely	Low
BU15	Potential travel cost increases caused by tolls or changes in travel time changes the shape of customer catchment of shopping precincts.	EPR B1 – Business support.	Corridor	Very low	2-7 years	Minor	Possible	Low	Traffic EPRs EPR T1 Optimise design performance and EPR T5 – Traffic monitoring.	Corridor	Very low	2-7 years	Minor	Possible	Low
BU16	Road detours or other changed road and car parking conditions affecting businesses as a result of operation of North East Link cause reduced ease of access for deliveries, staff and customers.	EPR T1 Optimise design performance.	Corridor	Medium	7+ years	Moderate	Likely	Medium	Traffic EPRs EPR T1 Optimise design performance and EPR T5 – Traffic monitoring.	Corridor	Medium	7+ years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
BU17	Business properties temporarily occupied during construction not reinstated to a condition that is suitable for the resumption of prior activities and operation.	EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR B4 – Minimise access and amenity impacts on businesses.	Local	Low	7 + years	Moderate	Unlikely	Low	EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR B4 – Minimise access and amenity impacts on businesses.	Local	Low	7 + years	Moderate	Unlikely	Low
BU18	Changed traffic patterns can reduce passing trade (where more traffic is in the tunnel).	EPR B1 – Business support.	N/A	N/A	N/A	Minor	Possible	Low	EPR B1 – Business support.	N/A	N/A	N/A	Minor	Possible	Low
Contamination and Soil															
CT10	Disturbance of contaminated soil in long term stockpile or disturbance of contamination that remains in-situ causes impacts to human health (via direct contact and inhalation) and the environment.	EPR CL1 – Implement a Spoil Management Plan	Local	Low	7+ years	Minor	Possible	Low	EPR CL1 – Implement a Spoil Management Plan	Local	Low	7+ years	Minor	Possible	Low
CT11	Ongoing abstraction of groundwater causes migration of contamination onto sites that otherwise may not have been impacted, resulting in soil impact off site and causes an impact to human health and the environment.	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception.	Municipality	Medium	7+ years	Moderate	Possible	Medium	EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods EPR GW4 – Implement a Groundwater Management Plan to Protect groundwater quality and manage groundwater interception. EPR GW5 – Manage groundwater during operation.	Municipality	Low	7+ years	Moderate	Unlikely	Low
CT12	Ongoing abstraction of groundwater causes migration of hazardous vapours, ground gases and/or dissolved methane and causes an impact to human health and the environment.	EPR CL6 – Minimise contamination risks during operation EPR GW5 – Manage groundwater during operation.	Local	Low	7+ years	Minor	Possible	Low	EPR CL4 – Minimise risks from vapour and ground gas intrusion EPR CL6 – Minimise contamination risks during operation EPR GW5 – Manage groundwater during operation.	Local	Low	7+ years	Moderate	Unlikely	Low
Ecology															
EC27	Shading from structures causing the loss or degradation of non-threatened flora and ecological communities.	EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Minor	Possible	Low	EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy. EPR FF2 – Minimise and offset native vegetation removal.	Corridor	Low	7+ years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
EC28	Shading from structures causing the loss or degradation of threatened flora and communities.	EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy EPR FF2 – Minimise and offset native vegetation removal.	Local	Medium	7+ years	Moderate	Possible	Medium	EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy. EPR FF2 – Minimise and offset native vegetation removal.	Local	Medium	7+ years	Moderate	Unlikely	Low
EC29	Groundwater changes during operation resulting in changes to terrestrial groundwater dependent ecosystems.	EPR GW2 – Monitor groundwater. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	7+ years	Moderate	Possible	Medium	EPR GW2 – Monitor groundwater. EPR FF2 – Minimise and offset native vegetation removal. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	7+ years	Moderate	Possible	Medium
EC30	Shading of waterways from structures causing the loss or degradation of aquatic and riparian vegetation that degrades aquatic habitat quality.	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications. EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy.	Local	Low	7+ years	Minor	Almost certain	Medium	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications. EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy.	Local	Low	7+ years	Minor	Almost certain	Medium
EC31	Operational noise, vibration and/or lighting resulting in elevated disturbance to threatened fauna,	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LV4 – Minimise operation lighting impacts. EPR NV2 – Monitor traffic noise. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Medium	7+ years	Moderate	Possible	Medium	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LV4 – Minimise operation lighting impacts. EPR NV2 – Monitor traffic noise. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Low	7+ years	Minor	Possible	Low
EC32	Operational noise, vibration and/or lighting resulting in significant impact on non-threatened native fauna	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LV4 – Minimise operation lighting impacts. EPR NV2 – Monitor traffic noise. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Corridor	Very low	7+ years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR LV4 – Minimise operation lighting impacts. EPR NV2 – Monitor traffic noise. EPR AR3 – Implement a Tree Canopy Replacement Plan.	Local	Very low	7+ years	Minor	Possible	Low
EC33	Enclosing waterways resulting in reduced viability of native aquatic species	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications.	Local	Low	7+ years	Minor	Unlikely	Low	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications.	Local	Low	7+ years	Minor	Unlikely	Low
EC34	Increased volumes of traffic resulting in death or injury of native fauna	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Corridor	Very low	7+ years	Minor	Possible	Low	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans.	Corridor	Very low	7+ years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC35	Groundwater changes during operation resulting in changes to aquatic groundwater dependent ecosystems.	EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan. EPR GW2 – Monitor groundwater. EPR GW5 – Manage groundwater during operation. EPR SW4 – Monitor water quality. EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Local	Medium	7+ years	Moderate	Likely	Medium	EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan. EPR GW2 – Monitor groundwater. EPR GW5 – Manage groundwater during operation. EPR SW4 – Monitor water quality. EPR CL2 – Minimise impacts from disturbance of acid sulfate soil.	Local	Low	7+ years	Minor	Possible	Low
EC36	Changed waterway form resulting in loss of connectivity and impeded passage for native aquatic species.	EPR FF4 – Protect aquatic habitat. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications.	Municipality	Low	7+ years	Moderate	Likely	Medium	EPR FF4 – Protect aquatic habitat. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications.	Municipality	Low	7+ years	Moderate	Likely	Medium
EC37	Changes to stormwater drainage resulting in hydraulic impact to waterways that degrades aquatic ecosystems.	EPR FF4 – Protect aquatic habitat. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Low	7+ years	Moderate	Possible	Medium	EPR FF4 – Protect aquatic habitat. EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Low	7+ years	Moderate	Unlikely	Low
EC38	Increased road traffic resulting in increased pollutants (metals, hydrocarbons) in stormwater runoff to waterways that degrades aquatic ecosystems.	EPR FF4 – Protect aquatic habitat. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW2 – Design to include spill containment. EPR SW8 – Minimise impacts from waterway modifications. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Low	7+ years	Moderate	Unlikely	Low	EPR FF4 – Protect aquatic habitat. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW2 – Design to include spill containment. EPR SW8 – Minimise impacts from waterway modifications. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
EC39	Shading of waterways resulting in reduced nutrient processing, leading to increased nutrient transport that degrades downstream aquatic ecosystems.	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications. EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy.	Wider region	Low	7+ years	Moderate	Possible	Medium	EPR FF4 – Protect aquatic habitat. EPR SW8 – Minimise impacts from waterway modifications. EPR LV1 – Design to be in generally in accordance with the Urban Design Strategy.	Wider region	Low	7+ years	Moderate	Possible	Medium
EC40	Groundwater changes in the vicinity of the tunnels causing long-term detrimental changes in terrestrial and aquatic ecosystems.	EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW5 – Manage groundwater during operation. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	7+ years	Moderate	Rare	Low	EPR GW1 – Design and construction to be informed by a Groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW5 – Manage groundwater during operation. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and mitigation plan.	Local	Medium	7+ years	Moderate	Rare	Low
Greenhouse Gas Impact Assessment															
GH02	Operational and maintenance activities including consumption of fossil fuels for electricity generation, operation of plant and equipment and transportation of materials and equipment result in greenhouse gas emissions, which could contribute to global climate change.	EPR SCC1 Implement a Sustainability Management Plan. EPR SCC2 – Minimise greenhouse gas emissions. EPR SCC3 – Apply best practice measures for energy usage for tunnel ventilation and lighting systems	Wider region	Low	7+ years	Moderate	Planned	Planned	EPR SCC1 Implement a Sustainability Management Plan. EPR SCC2 – Minimise greenhouse gas emissions EPR SCC3 – Apply best practice measures for energy usage for tunnel ventilation and lighting systems	Wider region	Low	7+ years	Moderate	Planned	Planned
GH03	Operation of the North East Link will cause a change in vehicle flow through Metropolitan Melbourne which may result in an increase or decrease in the overall vehicle emissions.		Wider region	Low	7+ years	Moderate	Planned	Planned		Wider region	Low	7+ years	Moderate	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
Ground Movement															
GM10	Groundwater "mounding" associated with Manningham Road Interchange retention structures may cause swelling or compaction related ground movements, adversely affecting adjacent utilities, Bulleen Road, commercial and residential buildings.	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment. EPR GM2 – Implement a ground movement plan to manage ground movement. EPR GM3 – Carry out condition surveys for potentially affected property and infrastructure.	Local	Low	2–7 years	Minor	Unlikely	Low	EPR GM1 – Design and construction to be informed by a geotechnical model and assessment.	Local	Very low	2–7 years	Negligible	Possible	Low
Groundwater															
GW06	Traffic accidents, spillage of hazardous materials, or events resulting in generation of contaminated stormwater runoff result in the degradation of groundwater quality.	EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW5 – Manage groundwater during operation.	Corridor	Low	3 months to 2 years	Moderate	Rare	Low	EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW5 – Manage groundwater during operation.	Corridor	Low	3 months to 2 years	Moderate	Rare	Low
GW07	Long term groundwater seepage into drained structures results in loss of operational capacity of existing, registered, groundwater users	EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation.	Municipality	Low	7+ years	Moderate	Rare	Low	EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation.	Municipality	Low	7+ years	Moderate	Rare	Low
GW08	Long term groundwater seepage into drained structures results in a groundwater drawdown in areas of in situ sulfidic sediments or rock and generates acidic conditions	EPR GW5 – Manage groundwater during operation.	Municipality	Very low	7+ years	Minor	Unlikely	Low	EPR GW5 – Manage groundwater during operation.	Municipality	Very low	7+ years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
GW09	Long term groundwater seepage into drained structures results in the dislocation of delineated, contaminated groundwater plumes.	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR CL1 – Implement a Spoil Management Plan to meet EPA requirements. EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods. EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation.	Local	Medium	7+ years	Moderate	Unlikely	Low
GW10	Buried structures such as tunnels and long cut-off walls, results in the creation of a barrier to groundwater flow and changes to groundwater levels.	EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW5 – Manage groundwater during operation.	Municipality	Low	7+ years	Moderate	Unlikely	Low	EPR GW1 – Design and construction to be informed by a groundwater model. EPR GW5 – Manage groundwater during operation.	Municipality	Low	7+ years	Moderate	Unlikely	Low
GW11	Management (disposal) of groundwater seepage entering into tunnels/ portals, results in the unacceptable impacts (eg salt loads, contamination) to point of discharge (eg waterway, sewer, groundwater)	EPR SCC3 – Minimise and appropriately manage waste. EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation EPR SW3 – Waste water discharges to be minimised and approved.	Local	Low	7+ years	Minor	Unlikely	Low	EPR SCC3 – Minimise and appropriately manage waste. EPR GW4 – Implement a groundwater management plan to protect groundwater. EPR GW5 – Manage groundwater during operation. EPR SW3 – Waste water discharges to be minimised and approved.	Local	Low	7+ years	Minor	Unlikely	Low
GW12	Unexpected contaminated groundwater seepage is not treated by the tunnel wastewater treatment plant resulting in groundwater being released to receiving environments (sewer and surface waters) or hazards to maintenance staff.	EPR GW2 – Monitor groundwater.	Municipality	Low	7+ years	Moderate	Unlikely	Low	EPR GW2 – Monitor groundwater.	Municipality	Low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Human Health															
HE07	Noise generated by the redistribution of traffic due to operation causes an increase in noise potentially affecting the health and amenity of the local community. In particular these impacts may increase annoyance affecting cognitive function in schools and workplaces, or increase sleep disturbance causing an increase in hypertension and increased risks of cardiovascular morbidity or premature mortality.	EPR NV1 – Achieve traffic noise limits. EPR NV2 – Monitor traffic noise.	Local	High	7+ years	Major	Possible	High	EPR NV1 – Achieve traffic noise limits. EPR NV2 – Monitor traffic noise.	Local	High	7+ years	Major	Unlikely	Medium
HE08	Tunnel operation leading to higher in car pollutant concentrations and exposures by occupants using the tunnels.	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality.	Local	Low	7+ years	Minor	Unlikely	Low
HE09	Redistribution of traffic on surface roads during operation changes ambient pollutant levels (particulate matter, nitrogen dioxide, carbon monoxide, volatile organic compounds and polycyclic aromatic hydrocarbons) and emissions from tunnel ventilation structures potentially impacting on the health of the surrounding the community. Health effects may include respiratory and cardiovascular effects morbidity or premature mortality.	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR EMF3 – Audit and report on environmental compliance. EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ4 – Monitor ambient air quality.	Wider region	Medium	7+ years	Major	Possible	High	EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR EMF3 – Audit and report on environmental compliance. EPR AQ2 – Design tunnel ventilation system to meet EPA requirements for air quality. EPR AQ4 – Monitor ambient air quality.	Wider region	Medium	7+ years	Major	Unlikely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
HE10	Changes within the community, such as altered access or connectivity to/between recreational areas and community facilities and active transport infrastructure may have implications to public safety and the wellbeing of individuals from the operation of the project.	EPR SC2 – Implement a Communications and Community Engagement Plan. EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Low	7+ years	Moderate	Possible	Medium	EPR SC2 – Implement a Communications and Community Engagement Plan. EPR T2 – Transport Management Plan(s) (TMP).	Corridor	Low	7+ years	Moderate	Unlikely	Low
HE11	Changes within the community from the permanent loss of green space and tree canopy areas resulting in impacts on the health and wellbeing of the community.	EPR LV2 – Minimise landscape impacts during construction [Implement landscaping enhancement (as part of permanent works) prior to construction works commencing, where practicable].	Corridor	Low	7+ years	Moderate	Planned	Planned	EPR LV2 – Minimise landscape impacts during construction [Implement landscaping enhancement (as part of permanent works) prior to construction works commencing, where practicable].	Corridor	Low	7+ years	Moderate	Planned	Planned
Historical Heritage															
HH08	(Operation) Changes to groundwater conditions including groundwater drawdown cause damage to significant trees and landscapes as part of heritage places	EPR HHI – Design and construct to minimise impacts on heritage. EPR AR1 – Maximise retention of trees, EPR AR2 Tree Protection Plan. EPR AR3 Implement a Tree Canopy Replacement Plan. EPR GW2 – Monitor groundwater. EPR GW3 – Minimise changes to groundwater levels through tunnel and trench drainage design and construction methods.	Local	Medium	7+ years	Moderate	Possible	Medium	EPR GW2 – Monitor groundwater. EPR GW5 – Manage groundwater during operation. EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR CL2 – Minimise impacts from disturbance of acid sulfate soil. EPR FF2 – Minimise and offset native vegetation removal. EPR FF4 – Protect aquatic habitat. EPR FF6 – Implement a groundwater dependent ecosystem monitoring and management plan.	Local	Medium	7+ years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Land use planning															
LU12	Impact of project on future redevelopment of land (ie redevelopment for residential, commercial and industrial land use).	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans, EPR. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise.	Municipality	Low	7+ years	Moderate	Possible	Medium	EPR LP1 – Minimise design footprint. EPR LP3 – Minimise inconsistency with strategic land use plans. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ1 – Implement a Dust and Air Quality Management and Monitoring Plan to minimise air quality impacts during construction. EPR NV4 – Implement a Construction Noise and Vibration Management Plan (CNVMP) to manage noise and vibration impacts. EPR NV10 – Minimise impacts from ground-borne (internal) noise.	Municipality	Low	7+ years	Moderate	Possible	Medium

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
LU13	Operation activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of residential land.	EPR LP1 – Minimise design footprint EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ4 – Monitor ambient air quality, EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ2 – Design ventilation system to meet EPA requirements for air quality. EPR AQ4 – Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR NV2 – Monitor traffic noise. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU14	Operation activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of open space and public conservation land.	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ4 – Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ2 – Design ventilation system to meet EPA requirements for air quality. EPR AQ4 – Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR B3 – Minimise and remedy damage or impacts on third party property and infrastructure. EPR NV2 – Monitor traffic noise. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LU15	Operation activities result in impacts associated with traffic, noise, air quality and visual considerations, impacting the ongoing use of education and community facility land uses.	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans. EPR AQ4 – Monitor ambient air quality. EPR AQ5 – Monitor compliance of in-tunnel air quality and ventilation structure emissions. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low	EPR LP1 – Minimise design footprint. EPR EMF2 – Deliver project in accordance with an Environmental Strategy and Management Plans, AQ2, AQ4, AQ5, B3. EPR NV2 – Monitor traffic noise. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPR LV1 – Design to be in general accordance with the Urban Design Strategy. EPR LV5 – Minimise operational lighting impacts. EPR SC2 – Implement a communications and community engagement plan. EPR T1 – Optimise design performance. EPR T5 – Traffic monitoring.	Corridor	Low	7+ years	Moderate	Unlikely	Low
Landscape and Visual															
LV02	Elevated road structures, road infrastructure, noise walls, flood walls, throw screens, viaducts, pedestrian bridges, vegetation loss, ventilation structures, works area and open cut causes adverse impacts to views experienced from within parklands and recreation, urban forest, mixed use activity centre, suburban residential and road corridor character areas.	EPR LV1 – Design to be generally in accordance with the Urban Design Strategy.	Wider region	Very High	7+ years	Severe	Planned	Planned	EPR LV1 – Design to be generally in accordance with the Urban Design Strategy.	Wider region	Very High	7+ years	Severe	Planned	Planned

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
LV03	Noise walls, loss of vegetation and roadside landscape treatment along the Eastern Freeway widening causes adverse impacts to the Eastern Freeway landscape character.	EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Corridor	Very high	7+ years	Severe	Planned	Planned	EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Corridor	Very high	7+ years	Severe	Planned	Planned
LV04	Shading caused by elevated structures and noise walls causes adverse impacts to residences, open space users, schools and other sensitive receptors.	EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LP4 Minimise overshadowing from noise walls and elevated structures.	Corridor	Very High	7+ years	Severe	Planned	Planned	EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LP4 Minimise overshadowing from noise walls and elevated structures.	Corridor	Very high	7+ years	Severe	Planned	Planned
LV05	Lighting infrastructure causing adverse impacts to views experienced from residential properties.	EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LV4 Minimise operation lighting impacts.	Corridor	Very High	7+ years	Severe	Planned	Planned	EPR LV1 Design to be generally in accordance with the Urban Design Strategy. EPR LV4 Minimise operation lighting impacts.	Corridor	Very High	7+ years	Severe	Planned	Planned
LV06	Elevated road structures, road infrastructure, noise walls, throw screens, viaducts, pedestrian bridges, vegetation loss, ventilation structures and open cut causes adverse impacts to views experienced from within the private domain.	EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Wider region	Very High	7+ years	Severe	Planned	Planned	EPR LV1 Design to be generally in accordance with the Urban Design Strategy.	Wider region	Very High	7+ years	Severe	Planned	Planned
Surface Noise Vibration															
SNV08	Traffic noise generated by the redistribution of traffic on the wider road network causes an increase in noise affecting amenity at sensitive receivers.	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Corridor	Medium	7+ years	Moderate	Possible	Medium	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Corridor	Low	7+ years	Moderate	Possible	Low
SNV09	Traffic noise mitigation measures required to reduce road traffic noise levels are not feasible, reasonable or practical.	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Local	Medium	7+ years	Moderate	Possible	Medium	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Local	Low	7+ years	Minor	Possible	Low
SNV10	Additional post-opening mitigation required.	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Corridor Local	High	7+ years	Major	Possible	High.	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Local	Medium	7+ years	Major	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SNV11	The traffic noise along the North East Link causes an increase in noise affecting amenity at sensitive receivers.	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Municipality	Medium	7+ years	Moderate	Possible	Medium	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise.	Municipality	Medium	7+ years	Moderate	Unlikely	Low
SNV12	Human impact vibration (VDV) at sensitive receivers generated by the redistribution of traffic due to operation causes an increase in noise.	EPR NV8 – Minimise construction vibration impacts on amenity.	Municipality	Medium	7+ years	Moderate	Unlikely	Low	EPR NV8 – Minimise construction vibration impacts on amenity.	Municipality	Medium	7+ years	Moderate	Unlikely	Low
SNV13	Structural damage at sensitive receivers, resulting from traffic on the North east Link.	EPR NV9 – Minimise construction vibration impacts on structures.	Local	High	7+ years	Major	Rare	Medium	EPR NV9 – Minimise construction vibration impacts on structures.	Local	Low	7+ years	Minor	Unlikely	Low
SNV14	Noise emissions from fixed plant exceed criteria and affects amenity at sensitive receivers.	EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system.	Local	High	7+ years	Major	Unlikely	Low	EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system.	Local	Low	7+ years	Minor	Unlikely	Low
SNV15	Increase in engine brake noise in community along North East Link.	EPR NV13 – Noise Mitigation – noise walls.	Local	High	7+ years	Major	Possible	High	EPR NV13 – Noise Mitigation – noise walls.	Local	Medium	7+ years	Minor	Possible	Medium
Social															
SO14	Infrastructure such as ramps near or surrounding the residential communities leading to a sense of isolation.		Corridor	Low	7+ years	Moderate	Rare	Low	EPR LP1 – Minimise design footprint.	Corridor	Low	2–7 years	Moderate	Rare	Low
SO15	Changes to amenity (noise, air and visual including overshadowing) of nearby residents due to road infrastructure being located nearer their homes slowly deteriorate lifestyle, increasing vulnerability over a period of time as the road achieves its full capacity.	Noise, Air and Visual EPRs.	Corridor	Very low	7+ years	Minor	Unlikely	Low	EPR NV1 – Achieve traffic noise objectives. EPR NV2 – Monitor traffic noise. EPR NV6 – Design permanent tunnel ventilation system to meet EPA requirements. EPR NV7 – Monitor noise from tunnel ventilation system. EPRs LV1 – Design to be generally in accordance with the Urban Design Strategy. EPR LV4 – Minimise operating lighting impacts. EPR LP4 – Minimise overshadowing from noise walls and elevated structures.	Corridor	Very low	7+ years	Minor	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SO16	Increase in traffic on feeder roads or on roads designated for re-distribution of traffic can deteriorate amenity (noise and air quality) for nearby residents over a period of time, increasing their sense of disadvantage.	Traffic EPRs, Air EPRs	Wider region	Medium	7+ years	Major	Possible	High.	EPR T5 – Traffic monitoring. EPR AQ4 – Monitor ambient air quality.	Wider region	Very low	7+ years	Moderate	Possible	Medium
SO17	The grade separated shared path crossings can deter some vulnerable groups from making the journey, increasing their isolation and sense of disadvantage.	Traffic EPRs	Corridor	Very low	7+ years	Minor	Unlikely	Low	EPR T1 – Optimise design performance. EPR T4 – Road safety design. EPR T5 – Traffic monitoring).	Corridor	Very low	7+ years	Minor	Unlikely	Low
SO18	Full or partial land acquisition of sporting and recreational facilities leads to permanent loss of the facility and in turn reduces opportunities for an active lifestyle, deteriorate social networks that people create through participation in sporting and recreational activities causing isolation, increasing sense of frustration.		Wider region	High	7+ years	Severe	Possible	High.	EPR SC4 – Minimise impacts on sporting, recreation and other facilities.	Wider region	Very low	3 months to 2 years	Moderate	Unlikely	Low
Surface water															
SW09	Project assets causing an increase in flooding frequency, velocity or level which affect users or assets within the floodplain.	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities.	Local	High	7+ years	Major	Unlikely	Medium	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW13 – Consider climate change effects.	Local	High	7+ years	Major	Unlikely	Medium
SW10	Diversion of stormwater, causing a change in flow to downstream water quality assets impacting on the performance of the asset.	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW11 – Adopt water sensitive urban and road design.	Local	Medium	7+ years	Moderate	Likely	Medium	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW11 – Adopt water sensitive urban and road design. EPR SW12 – Minimise impacts on irrigation of sporting fields. EPR SW13 – Consider climate change effects.	Local	Medium	7+ years	Moderate	Unlikely	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Residual Risk						
			Magnitude of effect						Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level	
SW11	Increase in impervious area resulting in an increase in flow discharge leading to bed or bank erosion causing instability of assets adjacent to the waterway.	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design.	Local	Medium	7+ years	Moderate	Unlikely	Low	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design	Local	Medium	7+ years	Moderate	Unlikely	Low
SW12	Increase in impervious area resulting in an increase in flow discharge leading to bed or bank erosion impacting on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW6 – Minimise risk from changes to flood levels, flows and velocities EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design	Wider region	Low	7+ years	Moderate	Unlikely	Low	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design	Wider region	Low	7+ years	Moderate	Unlikely	Low
SW13	Change in drainage alignment or discharge location concentrating flow and leading to bed or bank erosion causing instability of assets adjacent to the waterway.	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design	Local	Medium	7+ years	Moderate	Possible	Medium	EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design	Local	Medium	7+ years	Moderate	Possible	Medium
SW14	Change in drainage alignment or discharge location concentrating flow and leading to bed or bank erosion causing increased sediment loads impacting on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Medium	7+ years	Major	Unlikely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW6 – Minimise risk from changes to flood levels, flows and velocities. EPR SW8 – Minimise impacts from waterway modifications. EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Medium	7+ years	Major	Unlikely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect						Final EPR	Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
SW15	Spills from traffic during operation of the project being released into the waterways resulting in adverse impacts on the beneficial uses of the receiving water.	EPR SW2 – Design to include spill containment.	Wider region	High	7+ years	Severe	Possible	High	EPR SW2 – Design to include spill containment.	Corridor	High	7+ years	Major	Unlikely	Medium
SW16	Increase in impervious area leading to an increase in contaminants being released into the waterways resulting in adverse impacts on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Very low	7+ years	Moderate	Likely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW9 – Maintain bank stability. EPR SW11 – Adopt water sensitive urban and road design.	Wider region	Very low	7+ years	Moderate	Likely	Medium
SW17	A flood event occurring during the operation of the tunnels causing inundation of the tunnels resulting in an impact to public safety.	EPR SW7 – Develop flood emergency management plan.	Local	Very High	7+ years	Major	Rare	Medium	EPR SW7 – Develop flood emergency management plan.	Local	Very High	7+ years	Moderate	Likely	Medium
SW18	Water from tunnel drainage system being discharged to waterways resulting in adverse impacts on the beneficial uses of the receiving water.	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW3 – Waste water discharges to be minimised and approved.	Wider region	Medium	7+ years	Major	Unlikely	Medium	EPR SW1 – Discharges and runoff to meet State Environment Protection Policy (Waters). EPR SW3 – Waste water discharges to be minimised and approved.	Wider region	Medium	7+ years	Major	Unlikely	Medium
SW19	Insufficient capacity of road drainage design due to increased rainfall intensities from climate change resulting in an impact to public safety		Corridor	Medium	7+ years	Major	Possible	High	EPR SW13 – Consider climate change effects.	Corridor	Medium	7+ years	Major	Unlikely	Medium
SW20	Project assets leading to changes to water storages or supplies of irrigation assets affecting users.		Local	Low	7+ years	Minor	Likely	Medium	EPR SW12 – Minimise impacts on irrigation of sporting fields. EPR SW13 – Consider climate change effects	Local	Low	7+ years	Minor	Unlikely	Low
SW21	Project assets reducing the effectiveness of water quality treatment resulting in adverse impacts on the beneficial uses of the receiving water.		Wider region	Medium	7+ years	Major	Likely	High	EPR SW14 – Meet existing water quality treatment performance.	Wider region	Medium	7+ years	Major	unlikely	Medium

Risk ID	Potential threat and effect on the environment	Initial Risk							Residual Risk						
		Initial EPR	Magnitude of effect					Final EPR	Magnitude of effect						
			Extent	Severity	Duration	Overall consequence	Likelihood		Risk level	Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
Transport															
TR14	Traffic patterns on arterial and local roads in surrounding residential neighbourhoods are adversely impacted by traffic diverting to avoid tolls, curfews or temporary closures due to maintenance activity.	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Unlikely	Low	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Unlikely	Low
TR15	Traffic patterns on arterial and local roads in surrounding residential neighbourhoods are adversely impacted by traffic diverting to avoid incidents on the Freeway, or temporary closures due to incident response.	Redundancy plan developed to divert traffic in an incident or lane closure scenario.	Wider region	Very low	7+ years	Moderate	Unlikely	Low		Wider region	Very low	7+ years	Moderate	Unlikely	Low
TR16	Public transport services are adversely affected by delays or loss of travel time reliability due to additional traffic through key intersections, due to altered local traffic patterns or temporary closures due to maintenance activity	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Possible	Medium	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Possible	Medium
TR17	Pedestrians and cyclists are adversely affected by delays or loss of travel time reliability as a result of additional traffic through key intersections, due to altered local traffic patterns or temporary closures due to maintenance activity.	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Unlikely	Low	EPR T1 Optimise design performance.	Wider region	Very low	7+ years	Moderate	Unlikely	Low
TR18	Tunnel closures for emergencies or maintenance activity result in impacts on traffic patterns in residential neighbourhoods.	Advanced notice of maintenance activities. Redundancy plan developed to divert traffic in an incident or lane closure scenario.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low

Risk ID	Potential threat and effect on the environment	Initial EPR	Initial Risk						Final EPR	Residual Risk					
			Magnitude of effect							Magnitude of effect					
			Extent	Severity	Duration	Overall consequence	Likelihood	Risk level		Extent	Severity	Duration	Overall consequence	Likelihood	Risk level
TR19	Tunnel closures for emergencies or maintenance activity result in temporary impacts on public transport services and on pedestrian and cycle movements on arterial and local roads.	Advanced notice of maintenance activities. Redundancy plan developed to divert traffic in an incident or lane closure scenario.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low
TR20	Placarded loads and over height vehicles are unable to be identified in sufficient time to avoid tunnel closures.	Work with industry to inform them of what is restricted from entering the tunnels. Develop over-height detection plan and tunnel closure procedure.	Corridor	Very low	7+ years	Minor	Possible	Low		Corridor	Very low	7+ years	Minor	Possible	Low

Tunnel Vibration (no operational risks)