Environment Effects Act 1978
Planning and Environment Act 1987

EES Inquiry and Advisory Committee Report

Edithvale and Bonbeach Level Crossing Removal Projects

30 July 2018

VICTORIA State Government | Planning Panels Victoria

Environment Effects Act 1978

Inquiry pursuant to Section 9 of the Act

Planning and Environment Act 1987

Advisory Committee Report pursuant to section 151 of the Act

Edithvale and Bonbeach Level Crossing Removal Projects

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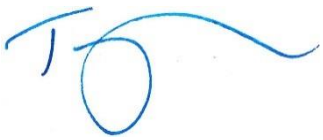

Trevor McCullough, Chair

Sandra Brizga, Member

Craig Barker, Member

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Contents

List of Tables

Page

List of Figures

Page

List of Abbreviations

AASS	Actual Acid Sulfate Soils
AHD	Australian Height Datum
ASS	Acid Sulfate Soils
BPEM	Best Practice Environmental Management Guidelines
BGL	below ground surface level
BS	British Standard
CASS	Coastal Acid Sulfate Soils
CASS–BPEM	Department of Sustainability and Environment, 'Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soil', 2010
CEMP	Construction Environmental Management Plan
CHMP	Cultural Heritage Management Plan
DELWP	Department of Environment, Land, Water and Planning
DNAPL	Dense Non Aqueous Phase Liquid
EAAF	East Asian Australasian Flyway
the EE Act	*Environment Effects Act 1978*
EES	Environmental Effects Statement
EMF	Environmental Management Framework
EPA	Environment Protection Authority Victoria
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)*
EPRs	Environmental Performance Requirements
EVCs	Ecological Vegetation Classes
FESWI	Friends of Edithvale Seaford Wetlands
GDE	Groundwater Dependent Ecosystem
HO	Heritage Overlay
IAC	Inquiry and Advisory Committee
IBA	Important Bird Area
IWRG	Industrial Waste Resource Guidelines
LNAPL	Light Non Aqueous Phase Liquid
LPPF	Local Planning Policy Framework
LVIA	Landscape and Visual Impact Assessment
LXRA	Level Crossing Removal Authority
Minister	Minister for Planning
MSS	Municipal Strategic Statement

NAPL	Non Aqueous Phase Liquid
PASS	Potentially Acid Sulfate Soils
PFAS	Per and poly-fluoroalkyl substances
PFHxS	Perfluorohexane sulfonate
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctane sulfonate
PTV	Public Transport Victoria
the Projects	Edithvale and Bonbeach Level Crossing Removal Projects
QA	Quaternary Aquifer
SEPPs	Victorian State Environment Protection Policies
TDS	Total Dissolved Solids
SEPP-AAQ	State Environment Protection Policy – Ambient Air Quality
SEPP-AQM	State Environment Protection Policy – Air Quality Management
SEPP-GoV	State Environment Protection Policy – Groundwaters of Victoria
SEPP-PMCL	State Environment Protection Policy – Prevention and Management of Contaminated Land
SEPP-WoV	State Environment Protection Policy – Waters of Victoria
SPPF	State Planning Policy Framework
UTAF	Upper Tertiary Aquifer
VPP	Victoria Planning Provisions
WSUD	Water Sensitive Urban Design

Overview

Project	
The Project	Edithvale and Bonbeach Level Crossing Removal Projects
The Proponent	Level Crossing Removal Authority
Subject Site	The level crossing at Edithvale Road is located south of the existing Edithvale train station between Nepean Highway and Station Street, approximately 32 kilometres from Flinders Street Station. The level crossing at Station Street/Bondi Road is located south of the Bonbeach train station between Nepean Highway and Station Street, approximately 35 kilometres from Flinders Street Station. The Bonbeach project area is located mostly within the existing rail reserve owned by VicTrack.
Victorian Statutory Approvals	• An amendment to the Kingston Planning Scheme under the *Planning and Environment Act 1987* for each project • A Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006* Other approvals required for the Projects under Victorian legislation may include: • A permit to take protected flora under the *Flora and Fauna Guarantee Act 1995* • A consent for works within a road reserve under the *Road Management Act 2004* • A licence to use groundwater and/or a permit for works on waterways under the *Water Act 1989* • A management authorisation to remove any wildlife under the *Wildlife Act 1975* • Consent under the *Coastal Management Act 1995*.
Commonwealth Statutory Approval	The Projects are a controlled action and require assessment and approval under the *Commonwealth's Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) before the two projects can proceed. Controlling provisions relate to the following: • Ramsar wetlands (sections 16 and 17B) • Listed threatened species and ecological communities (sections 18 and 18A) • Listed migratory species (sections 20 and 20A).
Planning Authority	Minister for Planning
Exhibition	Between 13 March and 2 May 2018
Submissions	Number of Submissions: 249

Inquiry process	
The Inquiry	A combined Inquiry appointed under section 9(1) of the *Environment Effects Act 1978* and an Advisory Committee appointed pursuant to Part 7, Section 151 of the *Planning and Environment Act 1987*.
Members	Trevor McCullough (Chair), Sandra Brizga and Craig Barker
Directions Hearing	Patterson River Golf Club, Bonbeach, 9 May 2018
Panel Hearing	Patterson River Golf Club, Bonbeach, 4, 5, 6, 7, 13, 14 and 15 June 2018
Site inspections	Unaccompanied, 9 May 2018 (and a number of other dates). Accompanied, 4 June 2018
Citation	Edithvale and Bonbeach Level Crossing Removal Project (EES) [2018] PPV Kingston PSA C155 [2018] PPV Kingston PSA C156 [2018] PPV
Date of this Report	30 July 2018

Executive summary

(i) The Projects

The rail level crossing removals at Edithvale Road, Edithvale and Station Street/Bondi Road, Edithvale (the Projects) are part of the Victorian Government's program to remove 50 of Victoria's most dangerous and congested level crossings.

In February 2017, the Victorian Government announced that the Edithvale and Bonbeach level crossings would be removed by lowering the rail into a trench.

(ii) The EES and IAC process

In April 2017 the Minister for Planning determined that an Environmental Effects Statement (EES) was required for the under the *Environment Effects Act 1978*. The reasons for the decision included that the Projects have potential for significant environmental effects, particularly on:

- *The regional groundwater regime with potential subsequent changes to hydrological conditions at the Ramsar listed Edithvale-Seaford Wetlands*
- *The ecological character and habitat values of the Edithvale-Seaford Wetlands, especially the critical components of habitat for listed waterbirds, and the wetlands' dependent flora and fauna, due to alterations in the groundwater regime*
- *The protected beneficial uses of groundwater, due to alterations in the groundwater regime, along with risks to human health, recreation and ecosystems due to changes in water quality from activation and excavation of potential acid sulfate soils and from interception/movement of existing contaminated soil and water.*

In addition, the Commonwealth Minister for the Environment and Energy determined that the level crossing removal projects at Edithvale and Bonbeach require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to the potential cumulative impact on the internationally-important Edithvale-Seaford Wetlands, listed threatened species and migratory species.

The Level Crossing Removal Authority (LXRA) prepared and exhibited an EES for the Projects.

The EES drew the following key findings[1]:

- The proposed rail trench at Edithvale has the potential to cause groundwater mounding. Engineering solutions can be developed to mitigate or avoid this impact.
- Groundwater mounding is not predicted to be as significant at Bonbeach, and no mitigation measures are proposed.
- Given the distance between the Projects and the Edithvale and Wannarkladdin wetlands, the Projects will not directly impact the wetlands through loss of vegetation or impacts on threatened species.

[1] Summary of main findings from Table 3.1 of the EES

- Native vegetation loss within the rail corridor can be minimised and where unavoidable it can be offset in accordance with Victorian Government policy.
- The Projects can be designed to prevent adverse environmental or health effects from disturbing, storing or influencing the movement of contaminated or acid-forming material, and be designed to protect beneficial uses (such as bore water use).
- Construction impacts are unavoidable but can be managed effectively using well-established practices.

Public exhibition of the EES was undertaken between 9 March and 2 May 2018, and 249 submissions were received.

A combined Inquiry and Advisory Committee (IAC) was appointed on 8 May 2018 to consider the EES and draft Kingston Planning Scheme Amendments C155 and C156 in accordance with the Terms of Reference approved by the Minister for Planning on 28 March 2018.

The IAC comprises Trevor McCullough (Chair), Sandra Brizga and Craig Barker. The purpose of the Inquiry is to investigate and provide an integrated assessment of the potential effects of the Edithvale and Bonbeach Level Crossing Removal Projects.

The IAC conducted public hearings on 4, 5, 6, 7, 13, 14 and 15 June 2018 at Patterson River Golf Club, Bonbeach, including submissions from LXRA, Kingston City Council, Friends of Edithvale-Seaford Wetlands, Mordialloc Beaumaris Conservation League Inc., Kingston Residents Association, No Skyrail: Frankston Line Community Association Inc. and a number of local residents.

Submissions raised the following key issues about the potential impact of the Projects:

- impacts on groundwater levels
- impacts on the Edithvale-Seaford Ramsar wetlands (including groundwater dependant ecosystems or dependent flora and fauna)
- impacts on international migratory bird species
- potential loss of coastal vegetation and/or dependent fauna, including provision for monitoring and mitigation
- flooding issues
- requests for additional car parking and/or bike parking to be provided
- requests that various existing pedestrian crossings be retained, such as at Eel Race Road, Fraser Avenue, Edithvale Road, Berry Avenue and Golden Avenue
- requests that provision be made for landscaping, tree planting, including use of native plants and other Project design issues.

The EES proposes and Environmental Management Framework (EMF) to manage the potential environmental impacts of the Projects, both during construction and in operation.

The key elements of the EMF are as follows:

- The Environmental Performance Requirements (EPRs)
- Urban Design Guidelines
- Construction Environmental Management Plan
- Community and Stakeholder Engagement Management Plan
- Construction Noise and Vibration Management Plan

- Cultural Heritage Management Plan
- Transport Management Plan.

The EPRs provide performance-based requirements that guide the preparation of the other elements of the EMF. The IAC has concentrated its assessment and recommendations on the content of the EPRs.

LXRA has prepared and exhibited draft Amendments C155 and C156 to the Kingston Planning Scheme that introduce Incorporated Documents to provide the necessary planning approvals for the Projects. The Incorporated Documents require the Projects are be constructed and operated in accordance with the EPRs approved by the Minister for Planning.

(iii) Inquiry and Advisory Committee Findings

The Panel has considered the EES and associated technical reports, all submissions and the extensive body of expert evidence provided and makes the following main findings:

Groundwater

In the absence of mitigation, the Edithvale Project has the potential to significantly impact on groundwater flows. It would be expected to exacerbate existing waterlogging at ground level to the east of the Project Area and cause minor changes to the hydrology of the Edithvale Wetlands.

Feasible engineering mitigation measures have been identified by LXRA for addressing the impact of the rail trench on groundwater flow for the Edithvale Project.

The application of the groundwater EPRs will reduce the impacts of the Edithvale Project on groundwater flows to an acceptable level and reduce consequential effects associated with changes to the groundwater regime.

The Bonbeach Project is expected to have lesser impacts on groundwater flows than the Edithvale Project, based on the inferred direction of groundwater flow and the location of the pile walls. Engineering measures for mitigation of impacts on groundwater flow have not been proposed by LXRA for the Bonbeach Project.

Groundwater drawdown on the western side of the Bonbeach rail trench has implications for reduced water availability in wells and bores, and reduced access to groundwater for coastal vegetation along the Bonbeach Foreshore. This can be appropriately managed through monitoring and mitigation plans that are required in the EPRs.

Biodiversity

The existing vegetation in the Project Areas needs to be removed to enable the construction of the rail trenches. The loss of native vegetation in the Project Areas is unavoidable and is proposed to be managed by offsets in accordance with State policy.

The Project Areas are situated over one kilometre from the Wetlands. On this basis, the Projects are not expected to have direct impacts on the Wetlands or species utilising the Wetlands for habitat.

With the proposed mitigation measures in place in the Edithvale Project, groundwater mounding is not expected to extend as far as the Edithvale or Wannarkladdin Wetlands. With these measures and application of the EPRs, the risk of adverse impacts on the Wetlands is low.

There is a risk of adverse impacts to foreshore vegetation arising from groundwater drawdown due to the Bonbeach Project. This risk can be appropriately reduced through works to improve the resilience of the foreshore vegetation as set out in EPR FF9. The IAC finds that monitoring and mitigation plans should continue to be required to address this risk.

Several uncertainties have been identified regarding the assessment of likely impacts on groundwater levels and quality, and consequential impacts on the Wetlands and other groundwater dependent ecosystems. Therefore, a comprehensive monitoring program and an extended period of monitoring and mitigation (a minimum of 10 years) is recommended.

Acid sulfate soils and contamination

It is likely that, during the excavation of the rail trenches, contaminated soil, contaminated groundwater, acid sulfate soils and some acidified groundwater will be encountered. The associated risks can be avoided through the application of EPRs CL1 to CL5 and the established regulatory framework for the management of contaminated materials.

Changes to the groundwater regime associated with the Projects has the potential to result in the mobilisation of contamination and acidification to the sub-surface. This risk can be minimised, through the application EPRs GW1 to GW5 and CL1 to CL5. Any changes to groundwater quality associated with contamination are likely to be temporary, localised and reversible.

Matters of national environmental significance under the EPBC Act

Matters of national environmental significance are summarised in Chapter 17.

With properly designed engineering mitigation measures at the Edithvale Project and application of all relevant EPRs, the Projects are not expected to have unacceptable impacts on the Edithvale Seaford Ramsar Wetland site. The Projects are not expected to have unacceptable impacts on threatened flora and fauna species nor migratory birds via changes in the ecological character of Edithvale Wetlands and Wannarkladdin Wetlands.

The impacts from light spill, noise, vibration and dust are primarily associated with construction, and are not expected to extend to the Edithvale Wetlands, which are over 1 kilometre from the Project Areas. The EPRs require a range of measures to mitigate risks associated with construction.

Overall findings on the environmental impacts of the Projects

The IAC has considered the applicable legislation and related policy and has been provided with submissions and evidence on relevant best practice. The EES and associated Technical Reports provide a comprehensive risk-based analysis and response. The EMF and EPRs proposed in the EES have been further improved by peer review and the expert evidence and submissions provided through the EES process.

The Projects are feasible, and the environmental outcomes are manageable subject to the EMF being implemented, including the monitoring and mitigation plans as set out in the EPRs.

The Projects will deliver an appropriate balance of environmental, economic and social outcomes subject to the EMF being implemented, including the monitoring and mitigation plans as set out in the EPRs.

The IAC has recommended changes to the EPRs that include requirements for more extensive monitoring and mitigation plans for the Edithvale and Wannarkladdin Wetlands and the Bonbeach and Edithvale foreshore vegetation. The EPRs, as modified, properly and comprehensively deal with the risks associated with the Projects.

(iv) Recommendations

Based on the reasons set out in this Report, the Inquiry and Advisory Committee recommends that the Projects be approved provided they are constructed and operated in accordance with the approved Environmental Management Framework and Environmental Performance Requirements.

The Inquiry and Advisory Committee recommends the following changes to the exhibited environmental and planning controls:

1. **Adopt the Inquiry and Advisory Committee preferred version of the Environmental Performance Requirements as shown in Appendix E.**
2. **Adopt the Inquiry and Advisory Committee preferred version of the Incorporated Documents as shown in Appendix F.**

PART A: BACKGROUND AND INQUIRY PROCESS

1 Introduction

1.1 The Inquiry

The Minister for Planning determined that an EES was required for the Edithvale and Bonbeach Level Crossing Removal Projects (the Projects) under the *Environment Effects Act 1978* on 5 April 2017. The reasons for the decision included that the Projects have potential for significant environmental effects, particularly on:

- *The regional groundwater regime with potential subsequent changes to hydrological conditions at the Ramsar listed Edithvale-Seaford Wetlands*
- *The ecological character and habitat values of the Edithvale-Seaford Wetlands, especially the critical components of habitat for listed waterbirds, and the wetlands' dependent flora and fauna, due to alterations in the groundwater regime*
- *The protected beneficial uses of groundwater, due to alterations in the groundwater regime, along with risks to human health, recreation and ecosystems due to changes in water quality from activation and excavation of potential acid sulfate soils and from interception/movement of existing contaminated soil and water.*

The Projects were referred to the Minister for Planning due to what was identified in a preliminary assessment as the potential for cumulative effects on the Edithvale-Seaford wetlands.

The referral identified one environmental impact, being the potential cumulative impact on the Ramsar-listed Edithvale-Seaford wetlands due to changes to regional groundwater, as being potentially significant.

The referral stated:

> *The proposed rail trenches are expected to impede the flow of groundwater resulting in higher water levels in the wetlands. Current modelling data indicated the change in groundwater level could be around 10 centimetres at the Edithvale component of the Edithvale-Seaford Wetlands, which is considered to be significant.*

The Minister's reasons further noted that other potential effects on the social or environmental setting (e.g. construction noise, traffic and transport impacts, and visual impacts) could be readily addressed through existing statutory processes and requirements under the *Aboriginal Heritage Act 2006*, *Environment Protection Act 1970* and *Planning and Environment Act 1987*.

In addition, the Commonwealth Minister for the Environment and Energy determined that the level crossing removal projects at Edithvale and Bonbeach require approval under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), due to the potential cumulative impact on the internationally-important Edithvale-Seaford Wetlands, listed threatened species and migratory species. The EES also considers the matters of national environmental significance for assessment under that Act and is accredited as an assessment able to inform the Commonwealth decision.

A combined Inquiry and Advisory Committee (IAC) was appointed on 8 May 2018 to consider the Projects EES and draft Kingston Planning Scheme Amendments C155 and C156 in accordance with the Terms of Reference approved by the Minister for Planning on 28 March 2018. The Terms of Reference are attached as Appendix A.

The IAC comprises Trevor McCullough (Chair), Sandra Brizga and Craig Barker. The purpose of the Inquiry is to investigate and provide an integrated assessment of the potential effects of the Edithvale and Bonbeach Level Crossing Removal Projects.

1.2 Inquiry process

The IAC was appointed under section 9 of the *Environment Effects Act 1978*, and an Advisory Committee under section 151 of the *Planning and Environment Act 1987*.

The EES and draft planning scheme amendments were placed on public exhibition between 9 March and 2 May 2018.

The IAC held a Directions Hearing on 9 May 2018 at Patterson River Golf Club, Bonbeach. The public hearings took place on 4, 5, 6, 7, 13, 14 and 15 June 2018 at Patterson River Golf Club.

1.3 Planning Scheme Amendments

The Level Crossing Removal Authority (LXRA) has prepared draft Amendments C155 and C156 to the Kingston Planning Scheme (The Amendment).

The draft Amendment C155 proposes to insert the *Edithvale Road, Edithvale Level Crossing Removal Project Incorporated Document, January 2018* (Incorporated Document) into the schedules to Clause 52.03 (Specific sites and exclusions) and Clause 81.01 (Documents incorporated in the scheme) of the Kingston Planning Scheme.

The draft Amendment C156 proposes to insert the S*tation Street/Bondi Road, Bonbeach Level Crossing Removal Project Incorporated Document, January 2018* (Incorporated Document) into the schedules to Clause 52.03 (Specific sites and exclusions) and Clause 81.01 (Documents incorporated in the scheme) of the Kingston Planning Scheme.

The Incorporated Documents will require plans and documents to be prepared to the satisfaction of the Minister for Planning (or the relevant planning authority) in accordance with an Environmental Management Framework (EMF) and Environmental Performance Requirements (EPRs).

1.4 Terms of Reference

The Terms of Reference require the IAC to produce a report to inform the Minister for Planning's Assessment of the Project under the *Environment Effects Act 1978* (the EE Act) and will also assist the Minister to make a decision about the proposed Amendments to the Kingston Planning Scheme to facilitate the Projects.

Paragraph 18 of the Terms of Reference sets out the purpose of the Inquiry:

> *18. In overview, the lAC is to:*
>
> *a. consider and report on the potential significant effects of the project investigated in the EES, taking into account the procedures and*

requirements of the Minister for the preparation of the EES under section 8B(S) of the EE Act (see Attachment 1) and the controlling provisions under the EPBC Act (see Attachment 2) as outlined in paragraph 12;

b. *recommend necessary avoidance, mitigation or management measures for the development of the project to balance project objectives with environmental, economic and social outcomes; and*

c. *assess the adequacy of the proposed environmental performance requirements and their suitability to achieve project-wide environmental outcomes, as described in the scoping requirements.*

Paragraph 19 requires that the lAC is to provide an integrated assessment of the potential significant environmental effects of the project.

Paragraph 20 sets out the purpose of the advisory committee:

20. The lAC is to undertake the following.

a. *Review the draft PSAs along with public submissions received in relation to the planning controls proposed by the draft PSAs.*

b. *Assess whether the planning controls proposed by the draft PSAs are appropriate to facilitate the use and development of the project.*

The more detailed requirements of the report are set out in paragraph 21 of the Terms of Reference.

1.5 Submissions

In response to the public exhibition of the EES, 249 submissions were received, including one late submission accepted at the public hearing.

The submissions relating to the EES are summarised in Table 1.

Table 1 Summary of EES related submissions

Number of submissions	EES related issue
10	Concerns about impacts on the Edithvale-Seaford Ramsar wetlands (including groundwater dependant ecosystems or dependent flora and fauna)
4	Concerns about impacts on listed migratory species
1	Request input into air quality management plan
4	Concerns about land contamination
4	Concerns about potential loss of coastal vegetation and/or dependent fauna, including provision for monitoring and mitigation
2	Concerns about the loss of vegetation in the rail corridor
2	General comments on the Environmental Management Plan
14	Concerns about impacts on groundwater levels
5	Heritage issues
1	Request to amend the Incorporated Documents
5	Concerns about the EES consultation process
5	Concerns about social impacts and accessibility
4	Flooding issues
10	Requests that various existing pedestrian crossings be retained, such as at Eel Race Road, Fraser Avenue, Edithvale Road, Berry Avenue, Golden Avenue
18	Requests that additional car parking and/or bike parking to be provided
12	Requests that provision be made for landscaping, tree planting, including use of native plants
4	Concerns about the visual impact of the Project
20	Other project design issues
1	Requests that a spoil management plan be required, to minimise transport carbon emissions and disturbance to the community and to explore opportunities for deposition of fill in the Green Wedge

In addition, a total of 223 submissions were received relating to the project scope. 215 of these supported road over rail (or opposed elevated rail), six supported rail over road, eight raised requests that the project be expanded and two questioned the need for the Projects.

Substantial submissions were provided by Kingston City Council and the EPA. Both generally supported the project subject to changes to the Environmental Performance Requirements (EPRs) or the Incorporated Documents.

The late submission received from Mr Williams (Submission 249) raised a number of issues relating to electrolysis. The submission was referred by the IAC to LXRA, but no response could be provided in the IAC's report timeframes. The IAC therefore has not considered Mr Williams' submission, apart from acknowledging the concerns raised and passing it on to LXRA for its consideration in the design and construction stages.

1.6 Limitations on the scope of the IAC's consideration

The IAC Terms of Reference require the IAC to "*consider and report on the potential significant effects of the project investigated in the EES*". The projects investigated are the removal of the Edithvale and Bonbeach level crossings and their replacement with rail under road solutions.

The EES did not consider a rail over road option and, accordingly, the IAC is not required to consider a rail over road option. The IAC notes that many of the submissions received urged the IAC to support either a road over rail or rail over road option. The IAC is clear that any such consideration is outside the scope of its Terms of Reference. The IAC made this clear to submitters to the public Hearing.

The IAC has restricted its consideration and report to the matters addressed in the EES, that is relating only to the rail under road projects.

1.7 Structure of this report

The IAC considered the exhibited EES and Amendment, all submissions and evidence provided at the Hearing by parties listed in the Overview table and all written submissions. In addressing the issues, the IAC has been assisted by the information provided to it as well as its observations from inspections of the Project areas and specific sites.

1.8 Acknowledgements

The IAC would like to acknowledge the substantial body of work undertaken by the staff and consultants engaged by LXRA in preparing the EES and its associated Technical Reports. The reports are of a high standard and are very comprehensive in identifying the key issues.

The IAC also acknowledges the detailed work done by submitters in preparing very high-quality submissions to the Inquiry process. The IAC applauds the respect shown by all submitters to the IAC and to each other in presenting their sometimes conflicting points of view.

The IAC would like to acknowledge the contribution of Elissa Bell, who provided professional advice to the Inquiry and the peer review of the report; and Greta Grivas, who provided project and administrative support to the IAC.

2 The Proposal

2.1 The Projects

The Projects are part of the Level Crossing Removal Program, a wider project of the Victorian Government to remove 50 of Victoria's most dangerous and congested level crossings. The Frankston rail line is considered to be a vital economic centre and a growing regional catchment.

In February 2017, the Victorian Government announced that the level crossings at Edithvale and Bonbeach would be removed, and that new stations would also be built at Edithvale and Bonbeach as part of each project.

On 5 April 2017, the Minister for Planning requested that LXRA prepare an EES under the *Environment Effects Act 1978* (EE Act) to assess the potential environmental effects of the projects.

Both the Edithvale and Bonbeach projects involve a grade separation to remove the level crossing using a rail trench within the existing rail corridor. The Edithvale and Bonbeach level crossings are located 1.3 kilometres and 2.5 kilometres respectively from the Edithvale-Seaford Wetlands. These wetlands are listed under the Ramsar Convention Wetlands of International Importance. Permanent infrastructure works are proposed to be located within the existing rail reserve owned by VicTrack.

LXRA anticipates that detailed design of the Projects will be completed, and construction will commence in 2019. Construction will be completed over an 18 month period.

2.1.1 Edithvale project

The level crossing at Edithvale Road is located south of the existing Edithvale train station between Nepean Highway and Station Street, approximately 32 kilometres from Flinders Street Station.

The Edithvale project involves lowering the Frankston rail line into a trench under Edithvale Road while maintaining Edithvale Road at the current road level, and removing the existing level crossing. The trench is proposed to be constructed between Lochiel Avenue and Berry Avenue, and will be up to 1,300 metres in length, 14 metres wide at the narrowest point, widening up to 24 metres at the new Edithvale Station.

New pedestrian bridges are proposed to be constructed to retain pedestrian access across the rail line. In addition, a new station generally at the same location as the existing station will be constructed with disability discrimination compliant access to the train platforms.

The Edithvale project area is located mostly within the existing rail reserve owned by VicTrack. It extends from Lincoln Parade, Aspendale to Chelsea Road, Chelsea as shown in Figure 1. It includes the rail corridor and all of Station Street and Nepean Highway to the east and west, and small sections of adjacent road reserves.

Edithvale Road, a declared arterial road, runs in an east-west direction between the Nepean Highway and Wells Road. Edithvale Road links Edithvale and surrounding suburbs to the Nepean Highway, the Mornington Peninsula Freeway (M11) and to Melbourne's eastern suburbs via Springvale Road, Eastlink and Westall Road.

Existing pedestrian and cyclist crossings in the vicinity of the level crossing are located at Lochiel Avenue, Edithvale Road, Denman Avenue, Fraser Avenue and Berry Avenue.

No private land will be required for the Project.

Figure 1 Edithvale project area

2.1.2 Bonbeach project

The level crossing at Station Street/Bondi Road is located south of the Bonbeach train station between Nepean Highway and Station Street, approximately 35 kilometres from Flinders Street Station. The Bonbeach project area is located mostly within the existing rail reserve owned by VicTrack.

The Bonbeach project involves removing the level crossing by lowering the Frankston rail line into a trench under Bondi Road while maintaining Bondi Road at the current road level. The trench is proposed to be constructed between Golden Avenue and The Glade, and will

be up to 1,200 metres in length and 14 metres wide at its narrowest point, widening up to 24 metres at the new Bonbeach Station platforms.

Decking above the rail trench will provide for the new station building and car parking, and new pedestrian bridges would be constructed to retain pedestrian access across the rail line. A new station at the same location as the existing station would be constructed with disability discrimination compliant access to the train platforms.

The Bonbeach project area extends from Chelsea Road, Chelsea to Patterson River, Bonbeach as shown in Figure 2. It includes the rail corridor and all of Station Street and Nepean Highway located to the east and west, and small sections of adjacent road reserves.

Figure 2 Bonbeach project area

Existing pedestrian and cyclist crossings across the rail corridor are located at Golden Avenue, Wellwood Road, Bondi Road and The Glade.

No private land will be required for the project.

2.2 Project benefits and constraints

The anticipated benefits of the projects are to:

- *Increase safety by eliminating the risk of collision between trains, vehicles, cyclists and pedestrians*
- *Reduce travel times and relieve congestion*
- *Revitalise the local communities at Edithvale and Bonbeach*
- *Help to ensure that Melbourne's transport system keeps pace with the city's growth.*[2]

LXRA has identified the key physical constraints as:

- *Maximum track gradients of two per cent*
- *Minimum clearances between the tracks and underside of structures of 5.75 metres*
- *Maintain access in accordance with the Disability Discrimination Act 1992*
- *Replacing pedestrian crossings in their existing locations, to the extent reasonably practicable.*[3]

2 LXRA Part A submission p4.

3 LXRA Part A submission p11.

3 Legislative and policy framework

3.1 Victorian legislation

Environmental Effects Act 1978

The *Environmental Effects Act 1978* contains a framework by which projects with the potential to have significant effects on the environment may require the preparation of an EES for assessment by the Minister for Planning.

After considering all relevant submissions and conducting any necessary hearings, the IAC's report will be provided to the Minister for Planning to assess the environmental effects of the project, and will be provided to relevant statutory decision-makers to inform their decision whether or not to approve the project and, if so, on what conditions.

The Minister's assessment determines whether the likely environmental effects of a project are acceptable, and whether any modifications or specific mitigation measures are required to achieve acceptable outcomes. Decision-makers are required to consider the Minister's assessment and are encouraged to consult with the Minister where it is not proposed to adopt the assessment.

Other approvals

The Projects require approvals under Victorian legislation, including:

- an amendment to the Kingston Planning Scheme under the *Planning and Environment Act 1987* for each project
- a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006*.

Other approvals required for the Projects under Victorian legislation may include:

- a permit to take protected flora under the *Flora and Fauna Guarantee Act 1995*
- a consent for works within a road reserve under the *Road Management Act 2004*
- a licence to use groundwater and/or a permit for works on waterways under the *Water Act 1989*
- a management authorisation to remove any wildlife under the *Wildlife Act 1975*
- consent under the *Coastal Management Act 1995*.

3.2 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

In addition to Victorian legislation, the Projects (action) require approval under the *Commonwealth's Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) because of their potentially significant impact on matters of national environmental significance.

On 8 May 2017, the delegate for the Commonwealth Minister for the Environment and Energy determined that the projects are a 'controlled action' and that further assessment and approval is needed under the EPBC Act before the two projects can proceed. This was due to potential impacts on the following three Matters of National Environmental Significance (MNES):

- Ramsar wetlands (sections 16 and 17B)

- Listed threatened species and ecological communities (sections 18 and 18A); and
- Listed migratory species (sections 20 and 20A).

Under the bilateral assessment agreement between the Commonwealth and Victoria, the EES is accredited as an assessment able to inform the Commonwealth decision under the EPBC Act. This means that the proponent's EES and the Minister for Planning's assessment must address certain requirements stipulated in the bilateral agreement. LXRA and DELWP consulted the Commonwealth Department of Energy and Environment on the scoping requirements for the EES, the draft EES and supporting technical reports covering MNES.

3.3 Other relevant legislation

Major Transport Projects Facilitation Act 2009

On 21 September 2017, the projects were declared by the Premier to be major transport projects under the *Major Transport Projects Facilitation Act 2009*. Under the Premier's declaration, the provisions of the *Major Transport Projects Facilitation Act 2009* apply to the projects with the exception of Part 3 (Assessment and approval of major transport projects) and Part 8 (Assessment Committees).

Once project approvals are obtained, LXRA can facilitate delivery of the projects by using the delivery provisions of the *Major Transport Projects Facilitation Act 2009*, in order to streamline public land access and temporary road closures and utility relocation.

Transport Integration Act 2010

The *Transport Integration Act 2010* provides a broad framework with six transport system objectives and eight decision-making principles.

At the strategic level, the business case for the Level Crossing Removal Project was developed and endorsed within this policy framework, implementing the requirements of the *Transport Integration Act 2010*.

The Minister for Planning must consider the objectives and decision-making principles of the *Transport Integration Act 2010* and determine the weight to be given to each of them when assessing this EES and deciding whether to approve the planning scheme amendments for the projects.

3.4 State and Local Planning Policy

Technical reports prepare for the EES included a Land Use Impact Assessment. The Assessment reviews relevant sections of the State and Local Planning Policy Frameworks and other relevant land use planning provisions. The key areas of State and local policy are summarised as follows:

(i) State Planning Policy Framework

Key State policy areas applicable to the projects include:

- Clause 11 – Settlement
- Clause 12 – Environment and landscape values
- Clause 13 – Environmental risks
- Clause 14 – Natural resource management
- Clause 15 – Built environment and heritage
- Clause 18 – Transport.

Of these, Clause 12 and 13 are most relevant to the EES:

Clause 12 (Environmental and Landscape Values) recognises that planning should help to protect the health of ecological systems and the biodiversity they support and conserve areas with identified environmental and landscape values. Planning must implement the environmental principles of ecologically sustainable development and should protect sites and features of nature conservation, biodiversity, geological or landscape value. Planning must consider and properly manage impacts on and the potential removal of native vegetation, and sites of particular environmental significance (e.g. Ramsar wetlands).

Clause 13 (Environmental Risks) recognises that planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. Planning should identify and manage the potential for the environment, and environmental changes, to impact upon the economic, environmental or social well-being of society. This includes floodplain management, noise abatement and air quality.

(ii) Local Planning Policy Framework (LPPF)

The following clauses within the LPPF for the City of Kingston are most relevant to the projects and the EES:

Clause 21.08 (Foreshore) recognises the importance of the Port Phillip coastline to recreation, scenic and coastal experiences. It seeks to optimise community enjoyment of the foreshore, to protect and minimise adverse environmental impacts on the coastal and marine environment, and to promote opportunities for development in activity nodes which is sensitive to natural coastal systems and which are compatible with the character and scale of the surrounding landscape. Edithvale and Chelsea are recognised as secondary activity nodes which have key linkages to hinterland open space, and have been identified as having opportunities to strengthen visual and physical linkages between railway station environs, commercial centre and foreshore activities. Key pedestrian and cycling trails are identified north to the south along the Nepean Highway.

Clause 21.09 (Environment Wetlands and Waterways) acknowledges that the environmental landscape of the City of Kingston is recognised for its diversity and significance in both a local and regional context, and specifically seeks to protect the physical and habitat diversity of the Edithvale-Seaford wetlands to recognise its role as an internationally significant wetland area and to maintain the diversity of flora and fauna habitats within Kingston. The Environment, Wetlands and Waterways Framework Plan identifies the Edithvale-Seaford Wetlands as a site of identified environmental significance and identifies the foreshore between the Nepean Highway and Port Phillip Bay as an area for indigenous vegetation enhancement adjacent to the foreshore. The Patterson River is identified as an area for the potential creation of habitat corridors, improvements to natural landscapes and the protection of significant remnant vegetation.

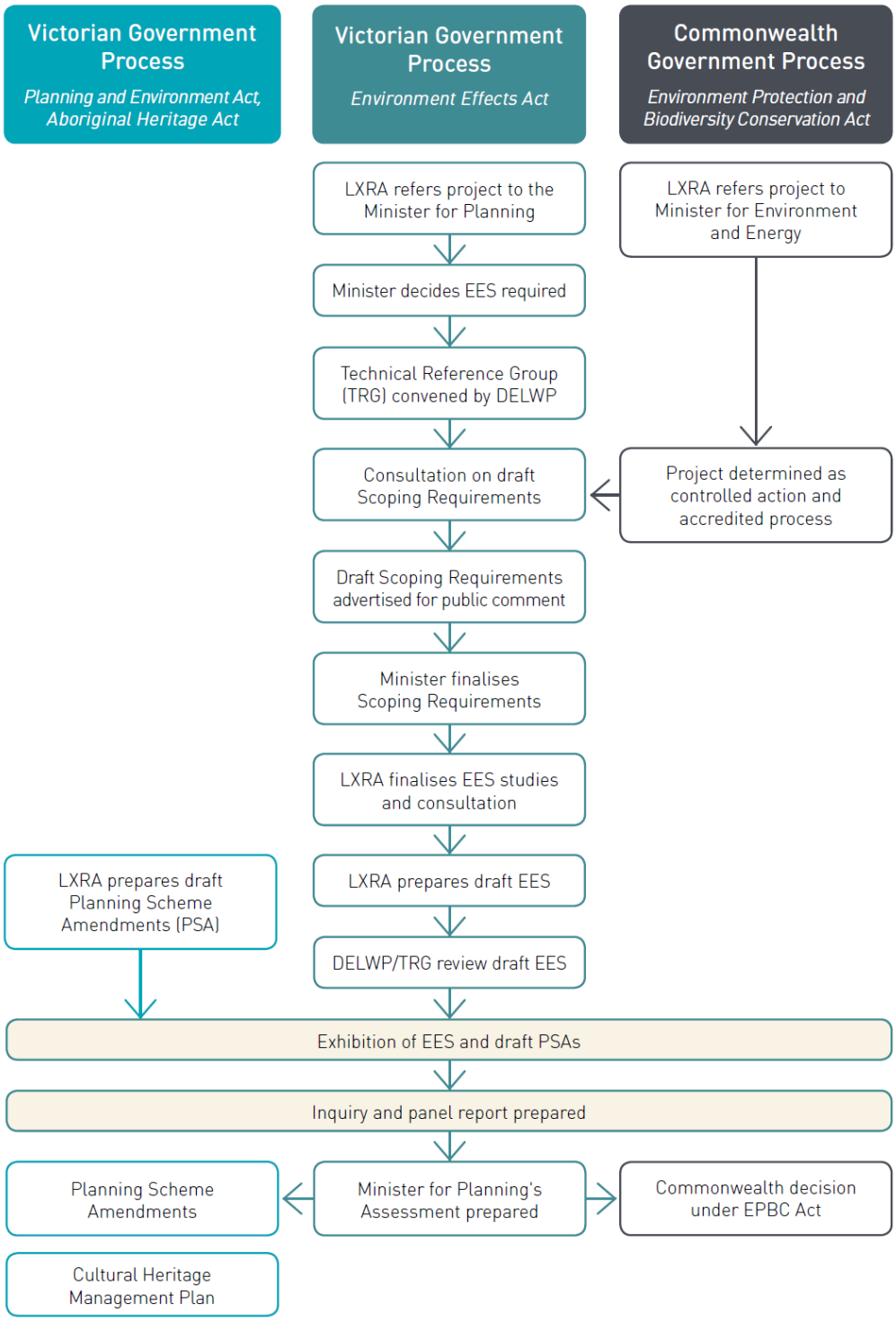
Clause 21.12 (Transport, Movement and Access) recognises the importance of a balanced transport network based on public transport, road, pedestrian and cycle systems in providing access for people to jobs and services, and goods to market. The Transport and Access Framework Plan identifies Edithvale Road as a freight capacity route with highest priority for improvement and the Nepean Highway as a Declared Main Road with capacity deficiencies.

4 EES assessment framework

4.1 The EES process

The EES process is set out in Figure 3, which is extracted from Chapter 1 of the EES.

Figure 3 EES process and legislative framework



4.2 Scoping requirements

Where an EES is required, scoping requirements are issued by the Minister to guide the preparation of the EES. The Minister for Planning issued scoping requirements for the EES in September 2017. The scoping requirements set out the matters to be investigated and documented by LXRA within its EES.

The draft Scoping Requirements for the EES were exhibited for public comment from 14 August 2017 to 4 September 2017 and the final Scoping Requirements were issued in September 2017.

The Scoping Requirements:

- detail the matters to be address in the EES
- contain evaluation objectives for the assessment of significant environmental effects
- require the EES to canvass an environmental management approach to ensure any environmental effects are identified and avoided, minimised or mitigated.

Section 3 of the scoping requirements details the matters to be addressed in the EES, and Section 4 of the scoping requirements requires the EES to identify any potential adverse environmental effects of the Projects, and sets out draft evaluation objectives and key issues to be addressed in relation to:

- Groundwater
- Biodiversity
- Contamination/acid sulfate soils.

4.3 EES response

LXRA submitted that the EES was prepared using a risk management approach to establish an environmental management framework.

The Environmental Performance Requirements (EPRs) form the focus for controlling and mitigating environmental impacts. Submissions to the IAC and much of the discussion at the public Hearing centred around the form and content of the EPRs.

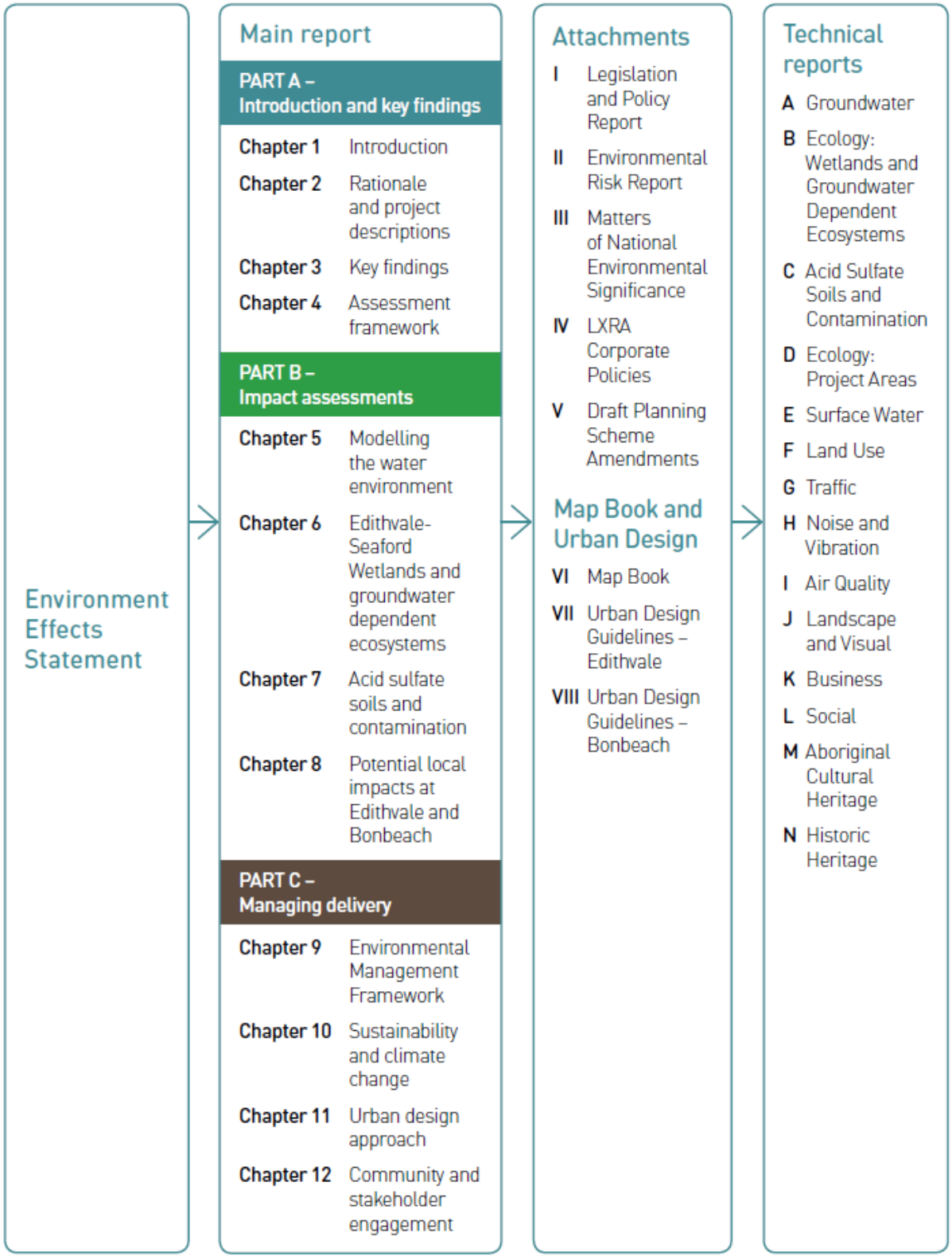
The EES assessment was informed by technical studies covering:

- Groundwater, including regional numerical groundwater modelling
- Biodiversity, with a particular emphasis on groundwater dependent ecosystem, including the Edithvale-Seaford Wetlands
- Contamination and acid sulfate soils.

The EES assessment process was also informed by technical investigations in the following topic areas: Ecology (within the Project areas); Surface water; Land use and planning; Transport; Noise and vibration; Air quality; Landscape and visual; Business; Social; Aboriginal cultural heritage; and Historic heritage.

The structure of the EES is shown in Figure 4.

Figure 4 EES structure



4.4 Environmental Management Framework (EMF)

The planning approvals required for the Projects are implemented through Incorporated Documents (introduced through draft Kingston Planning Scheme Amendments C155 Edithvale and C156 Bonbeach, which were exhibited with the EES). The Incorporated Documents provide the necessary approvals for the Projects to proceed provided that the Projects are constructed and operated in accordance with the EMF and, in particular, the EPRs approved by the Minister for Planning.

The Minister for Planning is the Responsible Authority for the Incorporated Documents, and is therefore responsible for the implementation and enforcement of the requirements set out in the Incorporated Documents, the EMF and EPRs.

The EMF provides the structure for managing the Projects that achieves compliance with environmental legislation and encourages continual improvement in environmental performance. The EMF establishes mechanisms for establishing and assessing performance against the Projects' environmental commitments; developing and implementing appropriate plans and procedures for all phases of the Projects; and monitoring, auditing, reviewing and reporting performance.

An EMF is a common approach to managing the environmental impacts of large projects, and has been employed for the East West Link, Melbourne Metro Rail, West Gate Tunnel, Victorian Desalination Plant and Peninsula Link projects.

The key elements of the EMF are as follows:

- the EPRs
- Urban Design Guidelines
- Construction Environmental Management Plan
- Acid Sulfate Soil Management Plan
- Community and Stakeholder Engagement Management Plan
- Construction Noise and Vibration Management Plan
- Cultural Heritage Management Plan
- Public Transport Disruption Management Plan
- Spoil Management Plan
- Transport Management Plan.

Other plans required by the EPRs (as exhibited) include:

- Groundwater Management and Monitoring Plan (EPR GW3)
- Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Foreshore Native Vegetation) (EPR FF7)
- Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Edithvale-Seaford Wetlands) (EPR FF8)
- Groundwater Quality Plan (EPR CL5).

The EPRs are set out in section 9.10 of the EMF. The EPRs cover a range of responses to risks identified in the EES.

Many EPRs require consultation to be undertaken with relevant stakeholders. The EPRs are performance based and generally require the preparation of a plan or design that meets certain outcomes.

PART B: ENVIRONMENTAL EFFECTS ASSESSMENT

5 Overview of potential impacts and the EES response

5.1 Potential impacts of the Projects

Chapter 3 of the EES summarises the key findings of the EES as follows:

> *Like all infrastructure projects, their construction and operation would change the local setting and potentially affect the local environment, particularly during construction. The construction activity would be disruptive, particularly to those who live adjacent to the works. However, the disruption would be temporary and LXRA would work closely with those affected to ensure a high level of communication is maintained throughout the construction period, which would ultimately deliver a high quality urban outcome that creates a much safer environment for residents of, and visitors to, Edithvale and Bonbeach.*
>
> *Once the railway is in trenches, potential effects of the projects would be associated with changes to the shallow groundwater levels through both Edithvale and Bonbeach. The detailed designs of the projects would be developed in accordance with the EPRs set out in Chapter 9 Environmental Management Framework, which would ensure that the potential effects are effectively managed and mitigated such that the evaluation objectives are met. Critically, it is considered almost impossible for the projects to affect the Edithvale-Seaford Wetlands as groundwater changes are not predicted to occur within 1,000 metres of the wetlands.*
>
> *The initial groundwater model prepared for the EES predicted that the trench proposed at Edithvale would result in groundwater mounding on the inland side that could potentially increase the frequency of water logging that already occurs on occasion in the Edithvale area. The same impact was not identified at Bonbeach.*
>
> *In response to the risk of water logging, activation of acid sulfate soils and a potential increase in the salinity of groundwater, an engineering solution was developed to enable groundwater to flow around the trench structure at Edithvale and reduce the potential mounding to within natural variability. The engineering solution was then tested using the groundwater model to confirm it would be effective to reduce groundwater mounding so that it would not result in additional water logging.*
>
> *Groundwater drawdown between the trenches and the coast may affect a small area of coastal vegetation and acid sulfate soils, but through implementing the EPRs, beneficial uses of groundwater would not be impacted. The assessment has not identified any potential impacts to human health or recreation.*

The key findings were summarised in Table 3.1 of the EES, which is reproduced below:

Topic	Key finding	Further information
Potential impacts to regional groundwater Section 3.3	The proposed trench at Edithvale has the potential to exacerbate existing water logging as a result of groundwater intersecting with the surface. The project would be designed to avoid this impact and ensure no significant impacts to the environment occur. An engineering solution has been developed and modelled using the independently peer reviewed groundwater model prepared for the EES to demonstrate this outcome is achievable. Groundwater flows in a different direction at Bonbeach compared to Edithvale and mounding is not predicted to cause waterlogging at this project.	Chapter 5 *Modelling the water environment* Technical Report A *Groundwater*
Edithvale Wetland Section 3.4.1	Given the distances between the Edithvale Wetland and the project sites (1.3 kilometres from the existing Edithvale Road level crossing and two kilometres from Bonbeach), the works would not directly impact the wetlands through, for example, loss of vegetation or disturbance to bird species. Furthermore, the groundwater modelling predicts that the effect of the trenches on regional groundwater would return to background levels at least one kilometre from the wetlands, such that the hydrological regime and ecological character of the wetlands would not be affected. The Edithvale-Seaford Wetlands would therefore continue to meet the applicable Ramsar listing criteria.	Chapter 6 *Edithvale-Seaford Wetlands and groundwater dependent ecosystems* Technical Report B *Ecology: Wetlands and Groundwater Dependent Ecosystems*
Groundwater dependent ecosystems Section 3.4.2	Terrestrial GDEs exist in a naturally variable environment in which water is accessed via the surface or groundwater. Both sources naturally fluctuate based on long-term climatic conditions and the prevailing weather and as such terrestrial GDEs must be adaptable and resilient to these variable conditions. Given the small change in groundwater predicted through the model it is likely changes to vegetation will be minor or negligible.	Chapter 6 *Edithvale-Seaford Wetlands and groundwater dependent ecosystems* Technical Report B *Ecology: Wetlands and Groundwater Dependent Ecosystems*
Native vegetation Section 3.4.3	Native vegetation is present within the rail corridor and would be removed to enable construction of the proposed rail trenches. Conservatively assuming that both project areas would be cleared of all vegetation, the area of affected native vegetation would total 2.2 hectares. This would be substantially minimised in finalising project designs and construction methodologies, clearing only what is necessary, and offsetting the impacted vegetation in accordance with Victorian Government policy.	Chapter 8 *Potential local impacts at Edithvale and Bonbeach* Technical Report D *Ecology: Project Areas*
Acid sulfate soils and contamination Section 3.5	The projects would prevent adverse environmental or health effects from disturbing, storing or influencing the movement of contaminated or acid-forming material, and be designed to protect beneficial uses. Excavation of material that is likely to be contaminated would be unavoidable, however implementation of well-defined and established practices to manage environmental and human health risks would be implemented.	Chapter 7 *Acid sulfate soils and contamination* Technical Report C *Acid Sulfate Soils and Contamination*

Topic	Key finding	Further information
Construction impacts Section 3.6	Construction would result in localised amenity impacts related to noise and transport network disruption, but can be managed effectively using well established practices. The potential impacts to the community during the construction of the two projects are typical of any construction project. Comprehensive environmental and traffic management plans would be implemented to ensure legislative and policy requirements are met, and an extensive program of community and stakeholder consultation would be undertaken prior to and during construction to ensure that the community, particularly residents and businesses that may potentially be directly affected, are aware of upcoming works and are able to plan their activities.	Chapter 8 *Potential local impacts at Edithvale and Bonbeach* Technical Reports E to N
Noise during operations Section 3.6	Noise modelling confirms that the projects would not exceed the investigation thresholds in the Passenger Rail Infrastructure Noise Policy.	Chapter 8 *Potential local impacts at Edithvale and Bonbeach* Technical Report H *Noise and Vibration*
Visual amenity Section 3.6	The areas surrounding the projects are highly valued for their coastal setting. The projects would change the visual appearance of the transport corridor through Edithvale and Bonbeach by replacing the existing at-grade rail infrastructure with a modern station building and precinct, car parking on deck, footbridges, safety barriers along the trench and a substation at Edithvale. Although vegetation would be lost, new landscaping would be established.	Chapter 8 *Potential local impacts at Edithvale and Bonbeach* Technical Report J *Landscape and Visual*

5.2 Inquiry approach to assessment

The IAC has considered the findings of the EES, along with information from technical reports and submissions and evidence provided to it, and has presented its assessment in Part B of this report under the following headings:

- Groundwater levels and flows
- Acid sulfate soils
- Groundwater quality
- Surface water
- Impacts on wetlands
- Impacts on foreshore vegetation
- Other social and environmental impacts
- Construction impacts
- Environmental Management Framework
- Integrated Assessment.

The general approach adopted is to describe the potential risks, analyse the EES response and review the monitoring and mitigation regime proposed for each issue.

In Part C of the report the IAC draws together its findings in relation to the Incorporated Documents, and provides its findings on the matters of Commonwealth interest.

6 Groundwater levels and flows

6.1 Introduction

The EES presented the assessment of potential impacts on groundwater levels and flows in Chapter 5 and Technical Report A. The investigations undertaken in relation to groundwater levels and flows were as follows:

- review of existing hydrogeological data
- a regional site geotechnical, hydrogeological and environmental investigation program across an area along the Frankston railway line extending from Cheltenham to Frankston, including drilling 146 geotechnical bores and the installation of 121 groundwater monitoring bores
- a hydrogeological and ecological site investigation program within the Edithvale Wetland to inform groundwater and hydrological modelling
- development of conceptual groundwater models, both at a regional scale and for the Edithvale Wetland
- development of a 3-dimensional regional numerical groundwater model
- development of a wetland hydrological model for the Edithvale Wetland
- risk and impact assessment for the Projects, with and without mitigation measures.

Evidence relating to groundwater and potential mitigation measures was received from six expert witnesses.

LXRA called the following expert witnesses at the hearing:

- Mr Tony Gauchi (assisted at the hearing by Mr Rikito Gresswell), and
- Mr Kim Chan.

They also provided written reports from:

- Dr Anthony Smith, and
- Mr J Richard Murphy.

Council called two experts. Their scope of evidence relevant to the current chapter is as follows:

- Dr Andrei Woinarski – hydrogeological modelling and its implication of changes to groundwater elevations on groundwater resources surrounding Project structures, and groundwater recharge to Edithvale Wetland
- Mr John Piper – implications and practicality of the groundwater re-distribution proposal for the Edithvale Project.

Many submissions were received relating to groundwater levels, including from Council, EPA, Friends of Edithvale Seaford Wetlands, Kingston Conservation and Environmental Coalition, Port Phillip Conservation Council, Kingston Residents Association, Mordialloc Beaumaris Conservation League and private residents.

6.2 The issues

Potential changes to the groundwater regime, and the implications of these changes for groundwater-dependent ecosystems (GDEs) including the Edithvale-Seaford Wetlands Ramsar site, were central to the Minister's reasons for decision that an EES was required.

6.3 What are the risks?

The EES presented a list of project risks, which identified that the Projects could potentially have the following impacts on groundwater levels and flows:

- Groundwater mounding on the landward side of the railway trenches
- Groundwater drawdown on the seaward side of the railway trenches, and
- Groundwater diversion resulting from the railway trenches and associated mitigation works (passive sub-surface horizontal drain).

These primary impacts could then have a range of secondary impacts, including [4]:

- Potential impacts arising from groundwater drawdown:
  - Reduced water availability for groundwater users
  - Saltwater intrusion, with impacts on beneficial uses of groundwater (Chapter **Error! Reference source not found.**)
  - Subsidence of unconsolidated sub-surface sediments, leading to adverse impacts on structures and buildings
  - Loss of native foreshore vegetation (Chapter 11)
  - Activation of CASS and/or mobilisation of existing acidity and groundwater acidification (Chapters 7 and 8).
- Potential impacts arising from groundwater mounding:
  - Waterlogging
  - Change in hydrological regime of the Edithvale Wetlands and Wannarkladdin Wetlands, with implications for wetland ecology (Chapter 10)
  - Increased exposure area and duration where existing sub-surface foundations experience groundwater levels at or near the ground surface
  - Contaminant mobilisation and migration (Chapter 8).
- Potential impacts arising from groundwater diversion:
  - Contaminant migration (Chapter 8).

This Chapter examines primary impacts on groundwater levels. Secondary impacts are discussed in other Chapters as indicated above.

6.4 Regional groundwater systems

The EES described the groundwater systems in the study area using conceptual hydrogeological models that summarised AECOM GHD's understanding of the groundwater systems in the study area. Figure 55 provides an overview of the groundwater systems at a regional scale. Figure 96 presents a more detailed conceptual model showing the relationship of the Edithvale Wetlands to the groundwater systems.

Figure 55 shows that there are two main aquifers that are of principal interest for the EES, the Quaternary Aquifer (QA) and Upper Tertiary Aquifers (UTAs). Each aquifer is underlain by an impervious formation, namely the Pleistocene Clay and Middle Tertiary Aquitard. There are also deeper aquifers, including the Lower Tertiary Aquifer and Basement Rocks Aquifer (not shown in Figure 55).

The railway line is situated on a sandy ridge which formed the outer barrier of the former Carrum Carrum Swamp, which extended from Mordialloc to Frankston (Figure 96). The

[4] Based on Technical Report A, Section 6 (risk assessment) unless otherwise indicated

barrier was artificially breached south of Bonbeach by the excavation of the Patterson River. Figure 55 shows that the sandy ridge is associated with the QA. The QA is unconfined and recharged primarily by rainwater. Groundwater flows away from the ridge towards the wetlands to the east and Port Phillip Bay to the west. At Bonbeach, groundwater flows in the southern part of the Project area are drawn towards the Patterson River.

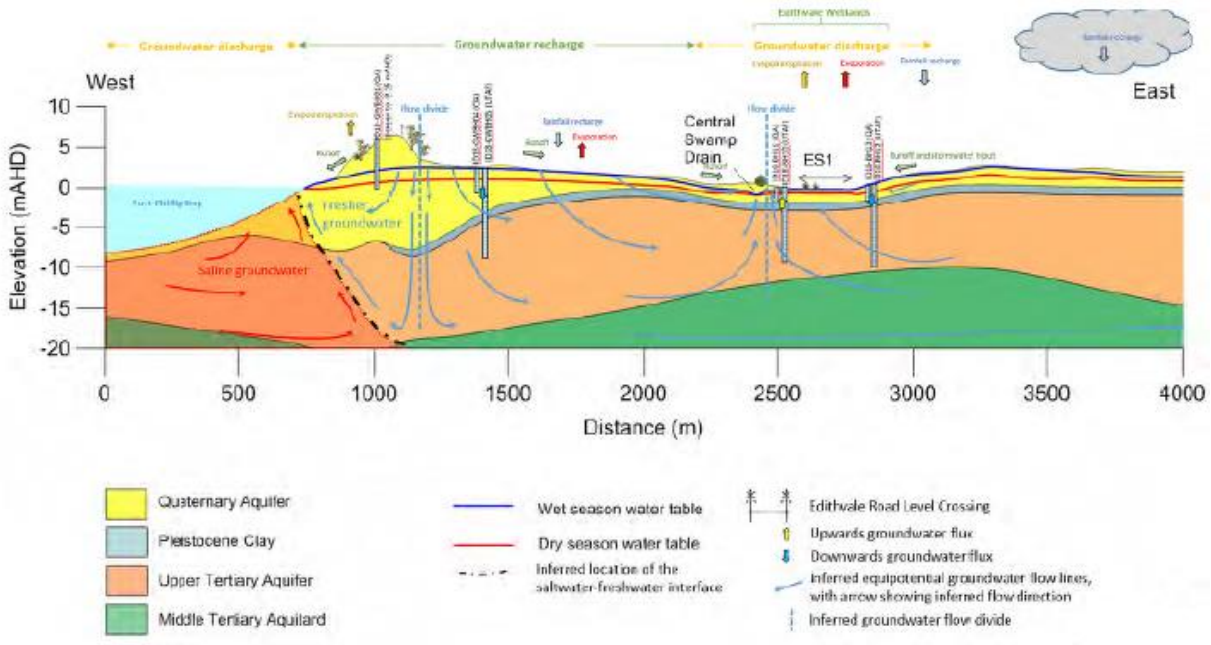
The UTA is semi-confined and is recharged from both the QA and regional groundwater flows. It discharges to the wetlands and Port Phillip Bay.

The detailed conceptual model for the Edithvale Wetlands shows that the deepest wetland cell, EN3, intersects the UTA. The other wetland cells at Edithvale North intersect the QA, which maintains water levels in the pools at EN1 and EN2. However, EN1 and EN2 are separated from the UTA by the Pleistocene Clay. Wetland cell ES1 at Edithvale South is shallower than the Edithvale North wetland cells and its base is significantly above the dry season water table of the QA.

Dr Woinarski (expert witness called by Council) agreed with the general conceptualisation of the groundwater systems presented in the EES, although he noted that he did not have access to the bore logs for many of the relevant boreholes used for the EES, which prevented him from providing a more a detailed assessment[5]. He noted that:

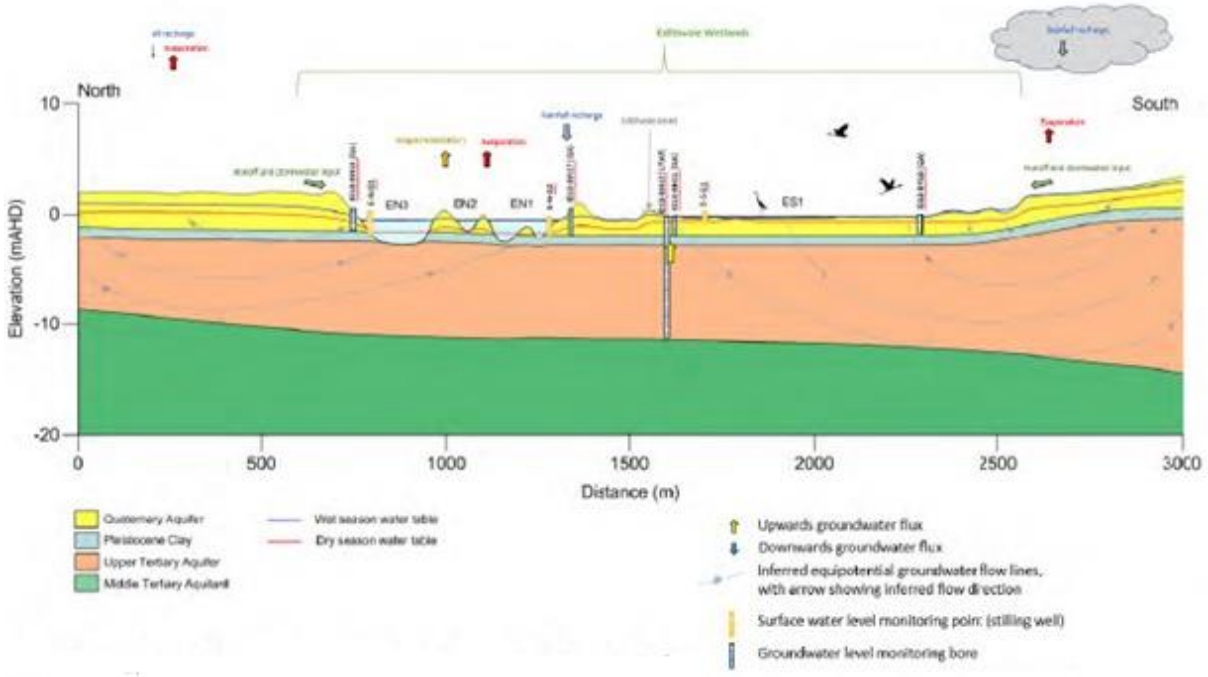
> *The extent of Pleistocene clays at the base of the Quaternary sediments in the study area was not clearly shown (and its inferred thinning to the west and absence in the northern area of the wetlands was not clearly incorporated in the flow model). The extent and thickness of clay-rich sediments in the Quaternary sediments may significantly change the sensitivity of recharge of the Edithvale swamp associated with lowering of the water table associated with construction activities[6].*

Figure 5 Conceptual model of groundwater systems in the study area[7]



5 Dr Woinarski, Expert Witness Report, p 7
6 Dr Woinarski, Expert Witness Report, p 14)
7 From Technical Report A, Figure 49

Figure 6 Conceptual model showing the relationship of the Edithvale Wetlands to the groundwater systems



6.5 Modelling

6.5.1 Regional groundwater model

(i) Evidence and submissions

The EES used a three-dimensional regional numerical groundwater model to determine the impact of the Projects on groundwater levels and flows. The model and calibration run results are presented in Appendix E of Technical Report A. The groundwater modelling software MODFLOW-USG, an unstructured grid version of the industry standard MODFLOW model, was used to undertake modelling[8]. The model extends from Cheltenham in the north to Frankston in the south and includes areas inland of the study area and part of Port Phillip Bay. The model has a total of 352,000 cells in nine layers[9]. The model calibration period was from January 1997 to June 2017[10].

Three different model scenarios were presented in the EES to assess the effects of the Projects and potential mitigation works (passive horizontal drain) on groundwater flows and levels:

- Existing condition – the calibrated model based on historical conditions[11];
- Projects with no mitigation – a predictive model with the pile walls in the Project areas[12] (This scenario also incorporates the pile wall for the Mentone level crossing removal site)[13].

8 Technical Report A, Appendix E, p 37
9 Technical Report A, Appendix E, p 37-38
10 Technical Report A, Appendix E, p 52
11 Technical Report A, Appendix E, p 52-77
12 Technical Report A, Appendix E, p 78-89
13 Technical Report A, Appendix E, p 87

- Projects with passive horizontal drains – a predictive model with the pile walls in the Project areas and passive horizontal drains at both Edithvale and Bonbeach[14].

The EES claimed that the predictive model had characteristics of 'Class 2' and 'Class 3' confidence levels (i.e. moderate to high confidence level) based on the Australian Groundwater Modelling Guidelines[15]. This was confirmed in a peer review[16].

Predictive uncertainty analysis was undertaken using the Monte Carlo method to examine the effects of uncertainty regarding model parameters. The analysis tested the sensitivity of the results to the effects of model parameters for hydraulic properties and boundary condition[17]. However, the predictive uncertainty analysis did not test for the effects of climatic variability.

The EES noted that:

> *climate over the past 20 years has experienced extreme conditions that included an extended period of drought (the Millennium Drought) … The rainfall trend is generally less variable prior to 1997[18].*

Climate change effects were examined on the basis of hotter and drier future conditions, with reduced recharge of unconfined aquifers, as indicated by the Victorian Government's "*Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria" (2016*)[19]. The potential effect of wetter conditions was not examined.

The following climate change scenario was run in the calibrated model with and without pile walls to assess the sensitivity of the predicted impacts to future climate change[20]:

- Recharge reduced by 52.8 per cent, and
- Sea level rise of 0.8 metres.

The EES noted the following limitations in the regional numerical groundwater model[21]:

- Most of the site-specific data used to construct the model was concentrated along the railway corridor, with limited data away from the railway corridor, leading to uncertainty regarding simulated groundwater behaviour
- The model does not explicitly represent discrete lenses of sand or clay that are known from bore logs
- There is considerable variation in monitoring periods for the groundwater data used in the models. The monitoring bores along the railway corridor have monitoring periods ranging from 2 months to 14 months.

The EES indicates that the regional numerical groundwater model was calibrated to two and a half years of groundwater level data at the Seaford Wetlands rather than the Edithvale Wetlands:

> *In the absence of similar long-term groundwater level data at the Edithvale Wetland, the quality of model calibration at the Seaford Wetlands has been*

14 Technical Report A, Appendix H, p 19
15 Technical Report A, Appendix E, p 89
16 Dr Smith, expert witness report, p 1
17 Technical Report A, Appendix E, p 90
18 Technical Report A, Appendix E, p 52
19 Technical Report A, Appendix E, p 99
20 Technical Report A, Appendix E, p 100
21 Technical Report A, Appendix E, p 104

> *used to demonstrate the reasonableness of similar groundwater and wetland interactions[22].*

Dr Woinarski (expert witness called by Council) reviewed the regional numerical groundwater model and concluded that:

> *Overall, the writer considers the model predictions inclusive of uncertainty are plausible. However, the writer recommends that model verification using additional hydrogeological data local to the sites should be included as part of pre-construction investigations and monitoring programs[23]*

A key concern raised by Dr Woinarski was that hydrogeological investigations supporting the numerical model may not have sufficient spatial and vertical density or temporal duration to characterise local conditions at a sensitivity appropriate for the predicted changes. For example, he noted that most of the monitoring wells were situated along the rail alignment rather than at transverse locations, making it difficult to determine the groundwater divide[24].

Other model limitations and issues identified by Dr Woinarski included:[25]

- The groundwater investigation was based on a relatively short period of monitoring
- The model accuracy is of the same order as the predicted local drawdown elevations from the model
- The model reasonably predicts temporal patterns of change in groundwater levels, but not absolute levels. The latter are important for relating groundwater levels predicted by the model to the elevations of key features such as wetland areas and groundwater extraction bores
- The model does not incorporate the effects of groundwater extraction from unregistered bores, which can affect shallow groundwater flows and may be critical regarding the assessment of potential impacts on the wetlands and groundwater use
- The effects of potential leakage through trench piles was not considered;
- The climate change modelling did not consider whether changes in rainfall intensity and seasonality or evapotranspiration are significant.

The Friends of Edithvale Seaford Wetlands[26] and Kingston Residents Association[27] expressed concern about uncertainties in the groundwater modelling. The Friends of Edithvale Seaford Wetlands submitted that they were "*very sceptical of the overall predicted outcome*"[28] and drew attention to the following sources of uncertainty in the groundwater modelling in relation to potential impacts on the Edithvale Wetlands and Wannarkladdin Wetlands:

- The short timeframe of the monitoring data used to establish and calibrate the model is insufficient to provide "an acceptable degree of comfort that the modelling is confirmed as being correct"[29]

22 Technical Report A, Appendix E, p 104
23 Woinarski, Expert Witness Report, p 16
24 Woinarski, Expert Witness Report, p 13 and 16
25 Dr Woinarski, Expert Witness Report, p 13 and 16
26 FESWI, paragraph 49
27 Kingston Residents Association, section 3
28 FESWI, paragraph 44
29 FESWI, paragraph 46

- The model is not sufficiently detailed to assess the potential impacts of the Projects at a scale relevant to the complex ecohydrology of the wetlands; for example, it does not account for variations in stratigraphy between different cells at the Edithvale Wetlands
- The modelling relies on the long-term efficacy and performance of the proposed sub-surface passive horizontal drain at Edithvale, does not assess the effects of potential failure mechanisms and is based on conceptual rather than detailed design
- The modelling does not consider potential impacts of the Projects on the salinity balance of the wetlands[30].

The EPA submitted that more detailed site-specific data should be collected to inform the risk assessment and develop and refine mitigation measures prior to the commencement of construction works, including data on groundwater quality, water table levels, groundwater flow velocity and flow direction[31].

(ii) Discussion

The EES presented a numerical regional groundwater model, which was used to examine the effects of the Projects on groundwater levels and flows.

The peer review by Dr Anthony Smith confirmed that the modelling was "fit for purpose" and did not contain significant technical flaws or errors.

However, the advice of Dr Woinarski was more guarded. He considered that the model predictions were "plausible" but identified a number of significant limitations, including concerns about whether the characterisation of local conditions in the model was at sufficient resolution to accurately predict and interpret impacts arising from the Projects. Concerns about uncertainties in relation to model predictions were raised in submissions by Friends of Edithvale Seaford Wetlands and the Kingston Residents Association. Dr Woinarski recommended that the model should be verified using additional hydrogeological data local to the sites as part of pre-construction investigations and monitoring programs.

(iii) Conclusion

The IAC considers that the regional numerical groundwater model is suitable for providing guidance on the nature and direction of impacts of the Projects at a regional scale but has greater limitations when applied at a local scale. The limitations of the model and associated uncertainties should be taken into account in the interpretation and application of the model results. Further verification of the model using additional local hydrogeological data should be undertaken prior to its use for design.

6.5.2 Edithvale Wetlands water balance model

The EES reported that a water balance model of Edithvale Wetlands was developed to assess potential changes in water levels and habitat extent resulting from the Projects. The model is discussed in Technical Report A, Appendix G. The water balance model uses predicted

30 FESWI submission, para 29, 44-46, 49, 53, 55

31 EPA Submission, p 7

groundwater fluxes from the regional numerical groundwater model as an input and relates these to water levels and habitat extent in the wetlands.

Dr Woinarski did not provide a detailed review of the water balance model. He noted that, given the groundwater model predicts negligible impacts on groundwater elevations at the wetlands, the water balance model is less critical to the assessment of impacts of the Projects[32]. However, he noted that if this changes, then further assessment of the Edithvale Wetlands Water Balance model sensitivity and prediction uncertainty should be undertaken.

6.6 Potential impacts of the Projects

The EES used the regional numerical groundwater model to determine the likely impacts of the Projects, both without mitigation measures, and with mitigation using passive sub-surface horizontal drains.

6.6.1 Projects with no mitigation

The EES indicates that, for each Project, groundwater levels are predicted to increase on the eastern side of the pile wall and decrease on the western side of the pile wall, due to the effects of the pile wall on impeding groundwater flow[33].

The impacts of the pile wall are predicted to be greater at Edithvale than at Bonbeach. The EES attributed this to differences in the position of the pile wall in relation to the groundwater divide. At Edithvale, the pile walls will be situated to the west of the groundwater divide. At Bonbeach, the northern section of the pile wall will be situated on the local groundwater divide, while at the southern end of the pile wall, the pile wall will be roughly parallel to the local groundwater flow, which is towards the Patterson River[34].

The amount of groundwater mounding is highly sensitive to climatic conditions, with a greater predicted increase in wet years than dry years[35]. The maximum height and extent of groundwater mounding and drawdown is predicted to occur in model year 5[36], which is the basis for the maps of predicted groundwater changes presented later in this report in the chapters on wetlands and foreshore vegetation (Refer Chapters 10 and 11).

The maximum groundwater mounding was predicted to occur in model year 5, 0.9 metres at Edithvale and 0.4 metres at Bonbeach[37]. Groundwater mounding at Edithvale was predicted to increase the area of land subject to waterlogging[38]. However, the mounding contour of 0.1 metres did not reach the Edithvale Wetlands in the model simulation period[39].

The modelling of the unmitigated scenario indicates minor change to the hydrology of the Edithvale Wetlands. Hydrological modelling using the 'Source Model' predicts minor changes to baseflow leading to minor changes in wetland water levels, but no discernible changes to wetted extent at the Edithvale Wetlands[40].

32 Woinarski, Expert Witness Report, p 20
33 Technical Report A, Appendix E, p 80
34 Technical Report A, Appendix E, p 80
35 Technical Report A, Appendix E, p 80
36 Technical Report A, Appendix E, p 80
37 Technical Report A, Appendix E, p 80
38 Technical Report A, Appendix E, p 80, Figure 40
39 Technical Report A, Appendix E, p 87
40 Technical Report A, Appendix E, p 87

The amount of groundwater drawdown on the coastal side of the pile wall is less variable. The maximum drawdown was predicted to occur in model Year 5, 1.4 metres at Edithvale and 0.7 metres at Bonbeach.

The EES tested the predicted impacts of the Projects on groundwater levels for sensitivity to a single climate change scenario which predicted reduce recharge and a rise in sea level, as outlined in the section above. The results for model Year 5 showed smaller and less extensive impacts at Edithvale in model Year 5. However, at Bonbeach, larger areas of drawdown and mounding are predicted due to an inferred slight shift in the local groundwater flow direction[41].

Dr Woinarski reviewed the assessments of predicted impacts on groundwater levels presented in the EES. He advised that the available information was insufficient to conclude that the Bonbeach project will have minimal impacts on groundwater. While he considered this to be plausible, he advised that further field data including additional monitoring bores transverse to the rail trench would be required to verify this[42].

Many submitters expressed concern regarding potential impacts on groundwater levels, including the EPA, Council, Friends of Edithvale Seaford Wetlands, Port Phillip Conservation Council, Kingston Residents Association, Kingston Conservation and Environment Coalition, Mordialloc Beaumaris Conservation League Inc. and a number of individual submitters[43].

Impacts on local groundwater users

Licensed groundwater bores were not predicted to be impacted by the Projects because all licensed groundwater bores are situated some distance away from the predicted area of influence of the projects[44]. Four registered stock and domestic bores are situated within the simulated drawdown areas. The yield of two of these bores (both near the Edithvale Project) may be compromised[45].

A submission from Mr Francis Williams[46] raised concerns about potential impacts on groundwater availability at Bonbeach. Mr Gauchi responded to this submission in his expert witness report by confirming that that groundwater drawdown on the coastal side of the trench could affect groundwater availability, particularly at Bonbeach[47].

Dr Woinarski advised that anecdotal information indicates widespread historical development of unlicensed bores for garden irrigation and domestic use[48]. He recommended further assessment of the existence of groundwater extraction bores near the Project areas should be undertaken. This would provide a basis for assessment of impacts on local groundwater users (as well as providing data that would help refine the groundwater model as discussed above). However, uncertainty in model predictions, particularly at the local scale, meant that monitoring and contingency mitigation measures would be necessary.

41 Technical Report A, Appendix E, p 100-101
42 Dr Woinarski, Expert Witness Report, p Woinarski, 16
43 Submission Nos. 1, 2, 8, 36, 121, 147, 216
44 Technical Report A, Appendix E, p 85
45 Technical Report A, Appendix E, p 103
46 Submission No. 147
47 Mr Gauchi, Expert Witness Report p 9
48 Dr Woinarski, Expert Witness Report, p 18

6.6.2 Projects with mitigation

Appendix H of Technical Report A presented the results of regional numerical groundwater modelling used to assess the potential effectiveness of a passive sub-surface horizontal drain as a mitigation option. It provided a comparison of three scenarios: existing condition, Projects with no mitigation, and Projects with passive horizontal drain. The groundwater mitigation options are discussed in Section 6.5 of this report.

The groundwater modelling results showed the passive horizontal drain would be effective in mitigating the impacts of the rail trench on groundwater levels at Edithvale. In particular, there would be:

- Significant reductions in the anticipated levels of drawdown (from -1.4 to -0.3 metres at 50 metres from the rail trench) and mounding (from +0.9 to +0.2 metres at 50 metres from the rail trench)[49]
- The spatial extent of groundwater mounding would be considerably smaller, with less than 0.1 metres of mounding at locations greater than 150 metres from the rail trench[50]
- There would be no additional periods of water logging and no increase in waterlogging duration compared to existing conditions[51].

However, at Bonbeach, the EES modelling results predict that a passive horizontal drain would exacerbate the groundwater mounding impacts[52] and increase the area affected by groundwater drawdown[53]. Overall, the EES concluded for Bonbeach that:

> *... the passive horizontal drain increases the predicted impact compared to the "no mitigation" scenario[54].*

The EES explained that:

> *The passive horizontal drain is not an effective mitigation option for the Bonbeach level crossing removal site as the local flow direction is sub-parallel to parts of the pile wall, rather than perpendicular to the pile wall as is the case at Edithvale[55].*

Dr Woinarski drew attention to a number of uncertainties in the mitigation scenario. He advised that:

> *… while the concept of a head-equalisation mitigation measure is plausible, there is considerable uncertainty in model predictions of drain performance over the long term[56].*

Dr Woinarski considered the conclusions that the passive sub-surface horizontal drain will mitigate the impacts of the Edithvale Project on waterlogging to be plausible. However, he advised monitoring and contingency mitigation options were necessary due to uncertainty in model predictions, particularly at the local scale required for waterlogging assessment, and

49 LXRA Part C submission
50 Technical Report A, Appendix H, p 25
51 Technical Report A, Appendix H, p 23
52 Technical Report A, Appendix H, p 38
53 Technical Report A, Appendix H, p 25
54 Technical Report A, Appendix H, p 26
55 Technical Report A, Appendix H, p 25
56 Dr Woinarski, Expert Witness Report, p 17

reliance on the ongoing performance of the passive horizontal drain[57]. The ESS did not present an uncertainty analysis regarding the model predictions for the mitigation scenario[58]. Dr Woinarski noted that the modelling assumed an ideal scenario, where the performance of the drain was not impeded by skin losses, clogging or blockages within the drain, all of which could be expected to occur over the life of the drain. He recommended that further work should be undertaken to address this by conducting a sensitivity analysis[59].

Dr Woinarski recommended that any revised design of the drain or other mitigation works should be modelled to confirm that the impact assessment conclusions do not detrimentally change[60].

Mr Gauchi's expert witness report provided the results of additional investigations undertaken by AECOM GHD after the completion of the EES, including sensitivity testing of groundwater modelling results to a range of different pipe diameters for the passive horizontal drain at Edithvale and range of pipe blockage scenarios[61]. These investigations indicated limited sensitivity to pipe diameter in the size range examined. A single discrete blockage at one end of the passive horizontal drain is not predicted to appreciably change its effectiveness but, multiple blockages along a significant length of the pipe would reduce its effectiveness.

6.7 Feasibility of groundwater mitigation options

(i) Passive Sub-surface Horizontal Drain

The EES outlines a potential design change to the rail trench comprising a passive sub-surface horizontal drain that provides a hydraulic connection across the rail trench to maintain the throughflow of groundwater and minimise project-induced changes to the maximum hydraulic head difference across the rail trench[62]. This was used as the basis for the mitigation option tested by groundwater modelling as discussed above. LXRA emphasised in the EES and submissions that this presents one feasible approach for achieving these objectives, noting that other approaches may also be feasible.

The EES indicates that the passive sub-surface horizontal drain would consist of a horizontal slotted pipe wrapped around the proposed structural tanking slab[63]. Key elements of the proposed passive horizontal drain include the following features:

- horizontal incline
- situated outside of the piled retaining walls of the rail trench
- high permeability
- permanently below the water table.

LXRA submitted that the design before the IAC is a 'concept design', and that it is contemplated that the concept design will be further refined as part of the detailed design phase[64]. The IAC agrees with LXRA's request to not mandate any particular approach to

57 Dr Woinarski, Expert Witness Report, p 18
58 Dr Woinarski, Expert Witness Report, p 17
59 Dr Woinarski, Expert Witness Report, p 17
60 Dr Woinarski, Expert Witness Report, p 17
61 Mr Gauchi Expert Witness Report, P 2
62 Technical Report A, Appendix H, p 1
63 Technical Report A, Appendix H, p 15
64 LXRA Part C submission

avoiding those impacts as this may exclude better, more refined, solutions[65]. Notwithstanding this, it is important to establish than an engineering solution can feasibly deliver the outcomes for groundwater levels shown by the "with mitigation" option for Edithvale as part of the EES assessment. This does not preclude an alternative engineering solution being eventually adopted as the final solution if it can be shown to be superior to the option assessed in the EES.

(ii) Feasibility and similar examples

The IAC directed LXRA to provide further advice on the likely effectiveness of the passive horizontal drain, including examples of where a passive horizontal drain has been successfully used as a mitigation measure in a similar situation.

Mr Gauchi addressed this matter in his expert witness report, where he indicated that he had undertaken a literature review (of publicly available sources) to find examples of existing projects that effectively managed groundwater though passive drainage designs. He concluded that:

> *The review did not identify any existing project examples where a long, linear sub-surface drain was implemented in a construction project, for the purpose of minimising project induced changes to groundwater levels and/or quality. Some examples of passive sub-surface drainage were identified, however, which typically related to small scale projects associated with foundations of proposed commercial developments[66].*

Mr Chan (expert witness called by LXRA) provided examples of projects which included some similar elements to the passive horizontal drain proposed in the EES, although he was unable to provide an example that was substantially the same as the current proposal. Nonetheless he advised that:

> *I consider that the contemplated passive sub-surface horizontal drain system is feasible for the Edithvale Project to minimise groundwater impacts on the surrounding areas[67] …*
>
> *the proposed system should not result in groundwater mounding on the upstream side of the railway trench or groundwater drawdown on the downstream side of the railway trench[68].*

Dr Murphy (expert witness export provided by LXRA) advised that:

> *It is my opinion that the proposed engineering solution, which includes the application of a passive horizontal groundwater collector and infiltration drain system can be an effective solution to reduce and limit the potential changes to groundwater levels that may result from the proposed construction of the trench at Edithvale …*

65 LXRA submission
66 Mr Gauchi, Expert Witness Report, p 1-2
67 Mr Chan, Expert Witness Report, p 1
68 Mr Chan, Expert Witness Report, p 2

> *I view the application of a horizontal system to be the preferred technical solution for managing the potential changes to groundwater relative to other engineering means such as vertical wells and/or pumping systems*[69]

Although Dr Murphy was unable to identify any directly comparable precedent, he regarded the sub-surface passive horizontal drain as being the adaptation of common measures for groundwater management[70]. In particular, he advised that:

- The upgradient side of the horizontal drain is a groundwater collection drain, which is a standard residential construction practice in Canada
- Horizontal drains are also used to collect water for groundwater remediation projects and landfill leachate collection – they often include a long-term pumping commitment to remove the groundwater that flows passively into the drain
- The down gradient side is the reverse of the upgradient collector. Dr Murphy is not aware of a directly comparable precedent; however, he was aware of groundwater recharge systems involving the pumped flow of collected water into recharge wells and ponds
- The proposed system is also similar to stormwater re-infiltration systems, which use perforated pipes in granular bedding to allow passive flow back into the sub-surface, although the standard implementation of such systems is normally above the groundwater table.

Mr John Piper (expert called by Council) identified a number of potential concerns with the passive horizontal drain but advised that:

> *None of the identified issues would prevent the construction of the level crossings at Edithvale or Bonbeach and can be all addressed during the detailed design. It is suggested that the horizontal drain proposal for Edithvale be further assessed for its practicality and ensure that there are no unintended consequences*[71]*.*

(iii) Construction, Maintenance and Performance Issues

The EES noted the passive horizontal drain would be at risk of physical clogging and indicated that this risk will need to be addressed in the detailed design[72]. Geotechnical investigations highlighted the heterogeneous nature of the sediments within the QA and UTA in terms of grain size present[73], suggesting that physical clogging may be a significant risk.

The EES noted the potential for hydrogeochemical precipitation and drain clogging[74]. The minerals in the local groundwater were supersaturated and therefore likely to precipitate and potentially contribute to scaling and clogging. The EES noted that this issue required further consideration and quantitative assessment in the development of the horizontal drain design[75].

69 Dr Murphy Expert Witness Report, pp 1-2)
70 Dr Murphy, Expert Witness Report, p. 3
71 Mr Piper, Expert Witness Report, p 16
72 Technical Report A, Appendix H, p 27
73 Technical Report A, Appendix H, p 27
74 Technical Report A, Appendix H, p 30
75 Technical Report A, Appendix H, pp 37-38

Mr Gauchi identified the following issues to be investigated in the detailed design of the horizontal drain:

- Local variations in lithology along the trench
- Variability in local groundwater chemistry and the potential for chemical clogging or precipitation of the drain
- The incorporation of redundancy measures, such as cross-trench pipes at regular intervals across the rail trench to reduce reliance on two cross-trench pipes at the project' extremities[76].

Mr Chan provided the following advice regarding a number of issues relating to the effectiveness and long-term performance of the passive horizontal drain[77]:

- Maintenance requirements for the drain include flushing and general maintenance. He recommended that the performance of the horizontal drain system should be regularly inspected following completion of construction, at least once a year for the first ten years, then less frequently if performance is satisfactory
- Repair or replacement of the horizontal drain would be difficult because of the depths involved, and any clogging of the drain and filter system could be difficult to clear. If the horizontal drain become ineffective, a shallow drain system could be adopted as a remedial option
- The long-term maintenance program for the drain should include monitoring groundwater levels upstream and downstream of the rail trench
- The period of groundwater monitoring should be for at least ten years
- The presence of silty and clayey sands within the dune sand deposits and had implications for hydraulic conductivity between the drain and groundwater
- The horizontal drain should be installed so that it intercepts the aquifer and not an underlying clay level that occurs close to the level where it is to be installed
- Contingency plans should be developed in case the horizontal drain becomes ineffective in the future
- Contingency measures could include an additional shallow horizontal drain below the historical high groundwater level, although the long-term durability of such a drain is a potential issue
- An active pumping system to dewater the upstream side of the trench and recharge the downstream side of the trench is a possible alternative contingency measure, particularly for short-term mitigation of impacts.

Dr Murphy identified a number of challenges that would need to be addressed in the detailed design[78]:

- Management of the natural groundwater level gradient along the rail trench, which may require segmentation of the system into reaches along the trench alignment
- Hydraulic connection between the pipe and filter media system, and surrounding groundwater system
- Maintenance access facilities to maintain good hydraulic function of the pipe and filter media in relation to sediment accumulation, geochemical precipitation and biological growth.

76 Mr Gauchi, Expert Witness Report, p 3
77 Mr Chan, Expert Witness Report, pp 2-4
78 Dr Murphy, Expert Witness Report, p 2

Mr Piper raised the following concerns regarding the horizontal drain[79]:

- The length of the drain, around 1300 metres at Edithvale
- The lack of grade and the potential for the pipe to "silt up" over time, reducing its effectiveness
- No allowance for clogging of the drain in the model – Mr Piper's experience in the local area indicates that iron deposition and biological clogging can occur
- The potential for settlement resulting in low spots along the pipe, creating a "syphon" effect
- Concentrated discharge of groundwater into the water table on the hydraulically down gradient side of the pipe, particularly if there are preferential flow paths such as areas of backfill around sewer trenches
- Distortion of groundwater flows by registered and unregistered groundwater extraction bores
- Migration of contaminated groundwater.

Mr Piper identified a number of other engineering solutions that could potentially be used as mitigation measures instead of or in conjunction with the proposed passive horizontal drain[80]:

- Multiple horizontal pipes connecting up-gradient and down-gradient sections of the aquifer on opposite sides of the trench
- Syphon pipes through the wall, down and across the rail trench
- Groundwater pumping upstream and groundwater injection downstream of the trench.

Mr Piper also advised that redundancy should be included in the system.

Concerns about the long-term effectiveness and management of the passive sub-surface horizontal drain were raised in submissions by the Friends of Edithvale Seaford Wetlands and Mr Ross MacFarlane.

(iv) Discussion

The EES proposed that a passive sub-surface horizontal drain be used to mitigate the impacts of the rail trench on groundwater for the Edithvale Project.

The IAC requested LXRA to provide example of where a similar approach has been successfully used elsewhere, but three expert witnesses called by LXRA (Mr Gauchi, Mr Chan and Dr Murphy) were unable to do so. However, all of these expert witnesses, as well as Mr Piper (expert witness called by Council) provided assurances to the IAC that it was technically feasible, from an engineering viewpoint, to provide an engineering solution that would satisfactorily mitigate the potential impacts of the Edithvale Project on groundwater mounding and drawdown at Edithvale.

The EES and all of the expert witness advice was consistent in advising that there were many issues that needed to be addressed at the design phase. Key issues included the following:

- The sub-surface horizontal drain would be at risk of clogging (due to physical, chemical and biological processes)
- Ongoing inspection, maintenance and monitoring would be required

[79] Mr Piper, Expert Witness Report, p 10

[80] Mr Piper, Expert Witness Report, p 11

- Repair or replacement of the horizontal drain would be difficult because of depths involved
- Continency measures and redundancy should be incorporated into the design.

The IAC is satisfied that integrated engineering measures can be developed to provide a feasible means of mitigating the impacts of the rail trench on groundwater at Edithvale, and that there are reasonable solutions to the design issues that may arise. It is likely that the necessary works will be more complex than a simple horizontal drain. For example, it may be necessary to install multiple drains across the trench to ensure that groundwater is bypassed to its intended destination as well as pumps to mitigate the risk of groundwater flowing in the wrong direction, from the seaward side of the trench inland. The structure will require ongoing maintenance and should incorporate redundancy to address failure risks.

(v) Conclusion

The sub-surface passive horizontal drain provides one possible approach to mitigating the impacts of the Edithvale project on groundwater levels. The IAC has received advice from four groundwater engineering experts indicating that the effects of the Edithvale Project on groundwater levels can be mitigated to a satisfactory degree, using either an integrated structure based on the concept of a passive horizontal drain or an alternative engineering solution.

The IAC accepts this advice, and agrees that that there are feasible options that will achieve the requirements of the EPRs.

6.8 Environmental Performance Requirements

(i) What is proposed?

The EES proposed that potential impacts of project on groundwater levels and flows would be addressed by the following EPRs:

- EPR GW1 - Rail trench design
- EPR GW2 - Groundwater performance outcomes
- EPR GW3 - Groundwater Management and Monitoring Plan
- EPR GW4 - Independent peer review
- EPR GM1, EPR GM2 – subsidence
- EPR CL1, CL4, CL5 – contaminant migration
- EPR FF7 – Foreshore Vegetation
- EPR FF8 – Edithvale Wetland.

LXRA subsequently proposed an additional EPR, EPR GW5 - Operational maintenance, in response to matters raised in submissions.

EPRS GW1 – GW5 are discussed in this chapter. EPRs GW1 – GW4 also include requirements relating to groundwater quality, which are discussed in Chapter 8.

(ii) Evidence and submissions

At the end of the Hearing, LXRA and Council both submitted changes to the groundwater EPRs GW1 - GW5, including some substantive changes and improvements to drafting. Friends of Edithvale Seaford Wetlands also made submissions in relation the these EPRS. The substantive changes proposed by each party are outlined in relation to each EPR.

EPR GW1 – Rail trench design

LXRA submitted that EPR GW1 should be amended to include the following additional requirements for the Edithvale Project:

- peer review
- a groundwater management system to minimise changes to groundwater levels caused by the Project
- engineering redundancy and contingency
- maintenance and inspection facilities.

Council agreed with these changes and submitted two additional requirements in relation to the Edithvale project:

- design components to enable monitoring of the quality of groundwater diverted or transferred by the groundwater management system
- measures to manage the transfer of contaminated groundwater.

Friends of Edithvale Seaford Wetlands submitted that EPR GW1 should be modified by inserting the following additional requirements:

- the design criteria should include requirements in regard to the provision of observation, inspection and maintenance capability
- redundancy for the proposed sub-surface passive horizontal drain should be provided by the insertion of a standby system built in at a slightly higher level.

EPR GW2 – Groundwater performance outcomes

LXRA submitted that EPR GW1 should be amended to:

- include a requirement for the rail trenches to be "operated" (as well as "designed") to meet the requirements of EPR GW2
- expand the potential consequences of groundwater drawdown specified in clause (b) to include "*damage to buildings, structures and other assets as a result of ground subsidence*"
- limit clause (b) to actual rather than potential impacts ("*causes*" rather than "*could cause*" impacts)
- limit clause (d) to "*significant negative impacts*" on GDEs (rather than "significant impacts")
- include a requirement to "*inspect*" and "*maintain*" as well as monitor the performance of the rail trenches to confirm that they are not having impacts exceeding those set out in EPR GW2
- amend the requirement for further monitoring and mitigation measures to be implemented to refer to "*other applicable EPRs*" as well as EPR GW2.

Council was generally in agreement with LXRA's proposed changes to EPR GW2. Key differences are as follows:

- Council proposed that clause (d) should refer to "a negative effect" on GDEs rather than be limited to "significant negative impacts" as proposed by LXRA
- Council proposed alternative wording for the final paragraph of EPR GW3 more clearly states a requirement to mitigate impacts than the wording proposed by LXRA.

Friends of Edithvale Seaford Wetlands submitted that EPR GW2 should be modified so that the risk of failure of the trench walls to provide an effective seal is addressed providing for a remediation program to maintain a "dry trench".

EPR GW3 - Groundwater Management and Monitoring Plan

LXRA submitted that EPR GW3 should be amended to require a "Groundwater Monitoring Plan" rather than a "Groundwater Management and Monitoring Plan".

LXRA submitted that the following changes should be made to the text of EPR GW3 to clarify requirements for groundwater monitoring:

- amend clause (a) to specify that the locations of groundwater monitoring bores should include within the vicinity of the foreshore and within the vicinity of the Edithvale Wetlands
- insert a new clause in relation to plume migration and contaminant transfer (discussed in Chapter 8 on groundwater quality)
- insert a new clause requiring the entity or entities responsible for implementation and review of the monitoring program to be specified.

Council made the following submissions in regard to EPR GW3:

- add a requirement for a trigger event description or levels to initiate "actions to maintain or reinstate compliance with groundwater performance outcomes (EPR reference GW2)"
- add a requirement for the periodic review of the groundwater monitoring program to occur not less than every second year.

The EPA submitted that the Groundwater Management and Monitoring Plan should include[81]:

> *details of contingency mitigation measures if the proposed groundwater management solution does not perform as predicted or intended.*

The EPA further submitted that it:

> *supports an establishment of baseline conditions through monitoring as a critical stage in developing the mitigation measures and detailed design of the projects.*

Friends of Edithvale Seaford Wetlands submitted that EPR GW3 should be amended to address the following matters:

- The monitoring program must be overseen be a single agency (DELWP) on behalf of all stakeholders, and the monitoring network assets should be assigned to that agency on the completion of the Projects.

[81] EPA Submission, page 7

- Clear triggers and criteria for action or intervention in groundwater management must be agreed by the overseeing agency, Kingston Council and Melbourne Water, and made public.
- The results of the monitoring should be reported six-monthly to all stakeholders.

EPR GW4 - Independent peer review

LXRA submitted EPR GW4 should be amended to require that the peer reviewer for the Groundwater Management and Monitoring Plan (EPR reference GW3) must be approved by the EPA.

Council agreed with LXRA's proposed changes to EPR GW4 and did not submit an alternative version.

Friends of Edithvale Seaford Wetlands submitted that the independent peer review and peer-reviewed design reports should be publicly available.

EPR GW5 - Operational maintenance

LXRA proposed that an EPR GW5 be added to address operational maintenance. The proposed wording is as follows:

> *The Edithvale project must be inspected and maintained to ensure that the groundwater management system continues to perform effectively.*

Council agreed with LXRA's proposed text for EPR GW5 and did not submit an alternative version.

In addition to their submissions relating to specific EPRs, Friends of Edithvale Seaford Wetlands submitted that the following general issues were not addressed in the EPRs proposed in the EES[82]:

- redundancy measures for the passive sub-surface horizontal drain
- specification of triggers in the groundwater and/or ecological monitoring that would necessitate intervention in environmental management and the nature of remediation required
- specification of the types of remediation measures to be undertaken if an adverse regime or a worst-case scenario is established that threatens the groundwater system for all sites
- specification of the agency responsible for undertaking the various measures and how the measures would be funded, including accountability for undertaking and funding monitoring and remedial actions, including measures outside the rail reserves – Friends of Edithvale Seaford Wetlands' position is that this this must be done by a single agency with transparent reporting to the public.

(iii) Discussion

The IAC has reviewed the submissions and evidence provided, and makes the following comments on its preferred form of the EPRs relating to groundwater levels:

EPR GW1 – Council agreed with changes submitted by LXRA and proposed two additional requirements relating to the management of groundwater quality. The additional

[82] FESWI Submission, para 46

requirements submitted by Friends of Edithvale Seaford Wetlands in relation to redundancy, inspection and maintenance have been addressed in the changes submitted by LXRA.

The IAC's preferred version of EPR GW1 is presented in Appendix E. It is based on the final version submitted by LXRA and the additional clauses proposed by Council, with the following modifications:

- Clause (a) is changed to specify an "*independent*" peer review, consistent with EPR GW4
- Clause (b) is modified to specify that the groundwater management system must minimise changes to groundwater levels caused by the Edithvale Project "*to meet the groundwater performance outcomes specified in EPR GW2*"
- The qualifier "*appropriately*" is removed from clause (b) and the qualifier "*appropriate*" is removed from clause (c)
- Clause (c) is modified by the specifying that the groundwater performance outcomes in EPR GW2 must be "*continuously*" met. This is in response to expert evidence from Mr Piper, who advised that delays in implementing groundwater mitigation measures can exacerbate secondary impacts arising from groundwater change[83].

EPR GW2 – the submissions from LXRA and Council are similar, with minor differences in drafting.

The IAC's preferred version of EPR GW2 is presented in Appendix E. It is based on the final version submitted by LXRA, with the following modifications:

- The IAC does not support LXRA's proposal to make clause (b) less precautionary than the exhibited version, therefore it has reinstated the reference to groundwater drawdown that "*could cause*" damage that was proposed in the EES rather limiting this clause to actual damage caused as inferred by the revised wording proposed by LXRA at the end of the Hearing (Version 3).
- The IAC prefers Council's proposed wording for Clause (d), i.e. "*a negative effect*" rather than "*significant negative impacts*" as proposed by LXRA. Given the very high conservation values and sensitivity to hydrological change of key GDEs, especially the Edithvale Wetlands, the IAC considers the more precautionary approach proposed by Council to be more appropriate.
- The IAC recommends that a new Clause (d) be introduced: "e. *changes to groundwater level that would have a significant negative impact to groundwater extraction from bores as a beneficial use*". Access to groundwater for use, particularly existing use, is an important right to land owners and should be protected.
- The IAC accepts Council's submission that the final paragraph of EPR GW2 should include a requirement to "*mitigate*" impacts as well as monitor them and has addressed this by inserting a reference to EPR GW3, which includes provision for measures to mitigate impacts on groundwater.

EPR GW3 - LXRA proposed at the end of the Hearing that EPR GW3 should be confined to a Groundwater Monitoring Plan and reference to management and mitigation be deleted. The IAC does not support this.

[83] Mr Piper, Expert Witness Report, p 17

The IAC's preferred version of EPR GW3 is presented in Appendix E. It is based on the version exhibited in the EES with modifications to address additional matters raised in submissions and at the Hearing; in particular matters raised by Council, Friends of Edithvale Seaford Wetlands and/or identified in expert evidence.

The IAC recommends the following changes to EPR GW3:

- The Plan should be prepared to the satisfaction of EPA, Melbourne Water, Kingston Council, DELWP and the relevant water authority.
- Monitoring should commence prior to the installation of the piled trench walls to establish baseline conditions as submitted by the EPA.
- More detailed requirements should be specified in regard to the location of the monitoring bores as submitted by LXRA. The IAC recommends that in addition to the locations proposed by LXRA, the required monitoring bore locations should include transects of monitoring bores between the Project areas and the wetlands as advised by Dr Woinarski.
- The IAC recommends that a single entity should have primary responsibility for the plan to ensure clarity and focus. The plan should specify this responsibility.
- Specification of the entity responsible for the ownership and management of monitoring network assets as submitted by Friends of Edithvale Seaford Wetlands.
- Insertion of a general requirement to maintain or reinstate compliance with EPR reference GW2, as proposed by Council.
- Cross references to the triggering of Plans under EPR FF7 and EPR FF8 have been amended to indicate that only the mitigation components of the plans would be triggered. Changes to EPRs FF7 and FF8 by the IAC mean that the monitoring components of the Plans under EPRs FF7 and FF8 are required to commence from the outset, at the same time as the Groundwater Management and Monitoring Plan, and should already be in place at the time any trigger event occurs.
- Insertion of a requirement for the Plan to include details of contingency mitigation measures if the proposed groundwater management solution does not perform as predicted or intended, as submitted by the EPA.
- Insertion of a requirement for periodic review of the Plan, as submitted by LXRA.
- A requirement for close coordination between the Groundwater Management and Monitoring Plan and the ecological monitoring plans specified in EPRs FF7 and FF8, to ensure that the necessary groundwater data are collected to interpret any ecological changes observed.
- Requirements that the plan and monitoring data should be publicly available, as submitted by Friends of Edithvale Seaford Wetlands.

EPR GW4 – At the start of the Hearing, LXRA submitted changes to EPR GW4 in response to the submission of the EPA and recommendations Mr Stuckey. It subsequently proposed editorial changes to reflect its proposal to change EPR GW3 to a Groundwater Monitoring Plan. As indicated above, the IAC does not support changing EPR GW3 to a Groundwater Monitoring Plan and prefers the version of EPR GW4 submitted by LXRA at the start of the Hearing. Council did not submit any changes to EPR GW4.

EPR GW5 – LXRA submitted proposed text in response to matters raised at the Hearing. No alternative submissions regarding this new EPR were received. The IAC recommends that LXRA's proposed text for EPR GW5 should be adopted.

6.9 Findings

The IAC makes the following findings in relation to groundwater impacts and flows:

Groundwater models

- **The EES presented conceptual and numerical models of the regional groundwater system that are 'fit for purpose' for determining the direction and indicative magnitude of likely impacts on groundwater levels and flows arising from the Projects.**
- **The models have some limitations that lead to a degree of uncertainty regarding the magnitude and detail of likely impacts on groundwater levels, and therefore waterlogging, groundwater users and GDEs. The models will require additional data and refinement to provide an adequate basis for the detailed design.**

Impacts on groundwater

- **The IAC generally agrees with the key findings of the EES in relation to potential impacts on regional groundwater.**
- **The Projects will interrupt the natural movement of groundwater in the QAs and UTAs that underlie the Project areas.**
- **The Projects are expected to cause groundwater mounding to the east (inland) of the Project areas and groundwater drawdown to the west (seaward) of the Project areas. Without mitigation measures, the impact will be significantly greater at Edithvale than at Bonbeach.**
- **The EES proposed incorporating mitigation works (a passive sub-surface horizontal drain) into the Edithvale project to reduce impacts on groundwater levels. Groundwater modelling has shown that horizontal drain at Edithvale would significantly reduce the impacts of the Edithvale Project on groundwater mounding and drawdown.**
- **Similar mitigation measures were not proposed for the Bonbeach Project, both because the magnitude of impact on groundwater is smaller than at Edithvale, and also because the groundwater modelling showed that a horizontal drain at Bonbeach would exacerbate, rather than mitigate, groundwater mounding and drawdown.**

Feasibility of mitigation options

- **The effectiveness of a passive horizontal drain for reducing groundwater mounding and drawdown at such a large scale is unproven, and a number of engineering challenges associated with the drain have been identified.**
- **All expert witnesses in the area of groundwater engineering stated that it should be feasible to mitigate the impacts of the rail trench at Edithvale to the required degree, although the final engineering solution may not necessarily be a passive horizontal drain. The IAC accepts this advice.**
- **The passive horizontal drain (or alternative mitigation works) should include redundancy in case the drain (or alternative works) fails to operate as expected.**
- **The passive horizontal drain will require ongoing inspections and maintenance to operate effectively.**

Monitoring and mitigation

- **Monitoring and mitigation are important because of uncertainties relating to the groundwater modelling and the performance of the passive horizontal drain at Edithvale.**
- **Additional 'baseline' monitoring of existing conditions is necessary to refine the groundwater modelling to provide more detail about the local groundwater conditions in the Project areas and their relationship to groundwater conditions at the wetlands. This should include additional investigation boreholes in the Project areas and transects of boreholes between the Project areas and at the wetlands. This additional work is necessary to provide a sound basis for developing the design of the rail trenches and mitigation measures and to ensure they comply with criteria established through the EPRs.**
- **Groundwater monitoring after project completion will be necessary for a number of reasons, including:**
  - **to test and confirm predictions regarding impacts of the rail trenches and incorporated mitigation measures on groundwater levels on groundwater levels, and assist in the monitoring of secondary impacts (e.g. impacts on wetland ecology or foreshore vegetation).**
  - **to confirm the ongoing effectiveness of incorporated mitigation measures (e.g. passive horizontal drain) and inform their operation and maintenance.**
  - **to assess the need for additional mitigation measures.**
- **The IAC recommends that the Groundwater Monitoring and Mitigation Plan be implemented for an initial period of ten years. A review should be undertaken to the satisfaction of EPA, DELWP, Council, Melbourne Water and relevant water authorities to assess findings at that time and determine future monitoring and mitigation requirements. The IAC expects that, as a minimum, some degree of ongoing monitoring of groundwater levels will be required to continue indefinitely for operational purposes, including maintenance of the mitigation works (the passive sub-surface horizontal drain or alternative mitigation works) at Edithvale.**
- **There is keen public interest in the potential impacts of the Projects on groundwater and GDEs. The IAC recommends that the results of the groundwater monitoring should be made publicly available in a timely manner.**

Changes to EPRs

- **The IAC recommends changes to EPRs GW1, GW2, GW3, GW4 and GW5 to reflect these findings. The IAC's preferred version of the EPRs is shown in Appendix E.**

7 Acid sulfate soils

7.1 Background

The EES scoping objectives require prevention of adverse environmental or health effects from disturbance, storage and the influence of transport/movement of acid forming material, where there may be potential for:

- Adverse environmental or health effects from the handling storage or transportation of Acid Sulfate Soils (ASS) or Potentially Acid Sulfate Soils (PASS) from construction piling or trenching
- Adverse environmental or health effects from other waste materials and streams generated from acidification.

Chapter 7 of the EES (Vol 1) details ASS issues and related groundwater quality impacts. EES Technical Report C discusses ASS and land contamination issues. Numerous site investigations were undertaken across the Study Area, as well as the broader Cheltenham-Frankston rail corridor.

ASS are associated with soils containing minerals, like iron sulphides (predominantly pyrite), often found close to the coast. The EES refers to 'Coastal Acid Sulfate Soils (CASS)' in its description of these. Normally given the setting where these are encountered, ASS exposure to air is minimal. Upon exposure, which can occur with excavation or dewatering of soils, iron sulphides react with oxygen and water ('oxidation') producing sulfuric acid. Acidification can spread to associated, more-mobile groundwaters and receiving surface waters, where acidification can release associated contaminants such as metals and nutrients, posing increased risks to ecology, human health and in–ground structures. 'ASS' is the collective name across both Actual Acid Sulfate Soils (AASS) and Potential Acid Sulfate Soils (PASS). AASS are soils containing iron sulphides, that have been previously exposed to oxygen, where they have become acidified by inorganic sulphide oxidation (where soil pH is ≤ 4.0).

Key guidance for the management of ASS is provided by:

- Victorian Department of Sustainability and Environment (2010), Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soil, (the 'CASS–BPEM')
- EPA Victoria (2009), Acid Sulfate Soil and Rock, Information Bulletin No. 655.1, July 2009
- EPA Victoria (2009), Industrial Waste Management Policy, 2009.

7.2 What are the risks?

Potential ASS impacts include:

- During construction, excavated spoil has the potential to contain ASS
- Potential for ASS activation (from groundwater lowering and introduction of oxygen into previously saturated, PASS or ASS soil areas) during construction
- Potential changes to the groundwater regime (as above), resulting in activation of PASS or ASS areas into the operational phase of the Projects.

7.3 EES response

The EES sets out the extent of site investigations undertaken to consider possible risk from ASS, leading into detailed design. A four–stage investigation and risk–appraisal process was adopted.

The EES states that for concept design, PASS or ASS zones have been well defined, where the development and implementation of the Acid Sulfate Soil Management Plan is to come through EPR CL2. Chapter 13 of the EES states that a best estimate (ex–situ, or bulked volume) of waste ASS spoil from the Projects may be 51,870 cubic metres (m^3), comprising:

- Placement of the piled walls is anticipated to make up 48 per cent of this volume
- Trench excavation will make up the remainder of the volume
- The Edithvale Project has the highest potential for the interception and generation of ASS (at 43,355 m^3 of the above total (some 84 per cent))
- The Bonbeach Project is considered to only have a limited potential for intercepting and generating ASS, where most of this is associated with deep trench excavation.

The EES indicated that current plans for the Projects across the piling installation phase, are to remove generated spoil from the Project Areas immediately (via truck load–out), where it is to be disposed off–site to a suitably licensed facility (Chapter 13). Significant ASS stockpiles are not expected to remain at Project Areas. It is expected that the exposure of remnant soil at the Project Area to oxygen from piling will be limited, where acidification of remaining (in–situ) soil should be negligible.

The EES found that for the Edithvale Project, there is a high potential of intercepting PASS or ASS from rail trench excavation. For the Bonbeach Project, while there is a reduced potential to intercept PASS or ASS, excavating deeper parts of the rail trench may result in some acidification.

The EES indicated that pre–placement of the piled walls for the trenches will significantly assist in preventing groundwater and surface water intrusion into the trenches. This should minimise waters contacting activated ASS, causing water acidification. The primary proposed management measure is the immediate removal of ASS impact spoil with trucks to a suitable licenced off–site disposal facility.

The construction risks associated with ASS have all been assessed as negligible in the EES, where it was considered that the potential material volumes were estimated to a suitable level of confidence. Based on this, the EES proposed that the Acid Sulfate Soil Management Plan (EPR CL2) and Spoil Management Plan (EPR CL1) should suitably manage the range and volumes of anticipated material, using well-known and proven construction industry methods.

Sections 6.3 to 6.6 discuss outcomes of predictive modelling of groundwater interaction from the rail trenches. Section 6.7 discusses potential mitigation measures to be considered for the Edithvale Project to ameliorate interference to groundwater flows and levels from aquifer damming.

Independent peer review of the EES studies on ASS and contaminated land was provided by Mr Mark Stuckey of Environmental Earth Sciences Victoria. Mr Stuckey confirmed that the investigation approach taken for the consideration of ASS and contaminated land deployed a sound and robust methodology that was well matched to best practice, using industry

accepted guidelines and legislation. He considered that the EES conclusions were appropriate and suitably conservative.

7.4 Evidence and submission

LXRA submitted that it has undertaken, for the conceptual design, a significant amount of site investigation to form a suitable view of PASS or ASS risk for the Projects, and has drawn the following conclusions:

- Due to the ground conditions and associated historical land use, PASS or ASS will be encountered during construction
- EPRs CL1 to CL4 provide for sufficient identification and management of risk during construction and further into operation for the Projects
- For the Edithvale Project, mitigation measures described within EPRs GW1 and GW2 will suitably address the risk of acidification (where predicted groundwater level changes are expected to lie within the general range of natural groundwater level variation for the Study Area)
- For the Bonbeach Project, some activation of small areas of PASS is expected to occur. Given the area involved, the associated risk is estimated as low, where such impacts would be localised and suitably managed through the EPRs
- The EPRs closely follow the guidance for the management of ASS set out by existing Victorian legislation and supporting policy framework.

Mr Stuckey provided evidence that the level of investigation for the current Projects' development stage was appropriate, to form a suitable appraisal across the risks posed and to allow development of appropriate EPRs for ASS and contaminated soil management across construction and operation.

Mr Piper in evidence for Council, noted that further work on PASS or ASS investigation, risk appraisal and management would be required as part of detailed design.

EPA (Submission 207) discussed the need for further, site–specific data to be collected in respect of soil and groundwater contamination, to better inform risk assessment and management across PASS or ASS. EPA indicated concern in relation to the potential lowering of groundwater levels and acidification of the sub-surface and called for the involvement of an independent peer reviewer, for further review of the Projects design and finalisation of risk mitigation measures.

Port Phillip Conservation and Council Kingston Residents Association (Submissions 235 and 242) raised concerns regarding the potential lowering of groundwater levels and activation of PASS or ASS in the sub-surface.

Port Phillip Conservation Council expressed concern regarding past engineering initiatives completed by Melbourne Water, in relation to wetlands, where ASS layers were, according to the submitter, previously breached by engineering works conducted at the Wannarkladdin Wetlands, causing acidification impacts to the ecology.

Kingston Residents Association also expressed concern regarding the wetlands, and the past performance of engineering works completed by Melbourne Water, at the Wannarkladdin Wetlands. They pointed to the previous excavation and exposure of an ASS layer in this area and the suggested impacts that this has caused. The Association requested that the

Precautionary Principle be rigorously observed, when considering the Projects, particularly with the heavy reliance on predictive modelling when seeking planning approvals.

Friends of Edithvale Seaford Wetlands expressed concern that if the rail trenches are imperfectly sealed, there is a risk of acid sulfate water entering the trench and being pumped to the stormwater drain system, which is connected to the local groundwater[84]. It submitted that EPR CL5 should be amended to specify requirements in relation to the treatment or handling of an acidified or contaminated groundwater that may enter the trench through imperfect walling[85].

7.5 Monitoring and mitigation

LXRA tabled revised versions of EPRs CL1 and CL5 at the Hearing (Document 49). The changes made were in response to submissions and to improve drafting of CL5 – Groundwater Quality Mitigation Plan.

The proposed EPRs set out monitoring and mitigation mechanisms relating to ASS as follows:

EPR CL1 dictates a Spoil Management Plan for the Projects. This will correlate with the Acid Sulfate Soils Management Plan.

EPR CL2 establishes the Acid Sulfate Soil Management Plan for the Projects, to incorporate suitable Victorian guidance, as well as that from other applicable information sources for the identification and suitable management of ASS (which includes disposal):

- Victorian Government (1999), Industrial Waste Management Policy (Waste Acid Sulfate Soils), 17 August 1999, Victorian Government Gazette, No. S 125
- EPA Victoria (2009) Acid Sulfate Soil and Rock, Information Bulletin No. 655.1, July 2009.

EPR CL3 sets how generated wastes from the construction of the Projects will be identified and managed. It requires a Construction Environmental Management Plan (CEMP) to be implemented, which requires consideration of the EPA 'Waste Management Hierarchy' as described under the Industrial Waste Resource Guidelines (IWRG) and chemical management procedures, to suitably manage: washing residues, slurries or other contaminated waters.

EPR CL4 refers to the following management and mitigation measures, in accordance with the key related Victorian State Environment Protection Policies (SEPPs), Water Industry Regulations 2006 and relevant EPA regulations, standards and guidelines:

- The completion of a baseline groundwater quality assessment (at least three months, prior to the commencement of Projects construction)
- Implementation of a system to manage and dispose of intercepted groundwater from the Projects (if required)
- Collection, treatment, disposal and handling of contaminated groundwater and slurries, including vapour
- Monitoring of intercepted groundwater quality during construction, with water quality monitoring at run–off containment areas
- Implementation of groundwater contamination plume management (if required)

84 Friends of Edithvale Seaford Wetlands, Hearing Document No. 26, p 14

85 Friends of Edithvale Seaford Wetlands, Hearing Document No. 26, p 21

- Treatment and monitoring of impacted groundwater (including vapour) prior to disposal, meeting requirements of the relevant authorities.

EPR CL5 requires a Groundwater Quality Mitigation Plan to be prepared in consultation with the applicable manager. This plan is to be prepared prior to the handover of the constructed Project asset to the rail infrastructure Asset Manager. The plan is to set measures to manage negative impacts to the beneficial use of groundwater (including water quality) caused by acidification attributable to the Projects, such that existing beneficial groundwater use is maintained.

EPR GW1 requires the Projects to be designed, so they meet the requirements of EPR GW2. This particularly applies for Edithvale, where sufficient mitigation redundancies and contingencies must be planned, such that EPR GW2 can be achieved.

EPR GW2 requires the Projects to be designed and operated, such that changes to the groundwater regime do not result in degradation to groundwater quality, which would preclude beneficial use of groundwater.

EPR GW3 requires a Groundwater Management and Monitoring Program across groundwater levels and quality, to allow detection of any changes to these parameters.

Under EPR SC1, a Community and Stakeholder Engagement Management Plan is to be established with Council.

7.6 Discussion

Through EPR CL2, the location, nature and extent of PASS or ASS is to be further identified with improved accuracy for the detailed design, construction and operation of the Projects.

LXRA have indicated that EPA will be consulted for the preparation of the Acid Sulfate Soil Management Plan (under EPR EMF 2).

Current spoil volume estimates for PASS or ASS materials from the Projects are considered appropriate for this phase of concept design. From the total estimated amount of spoil from the Projects (358,000 m^3 ex–situ volume), the majority of this (over 70 per cent) ranks as cleaner 'Fill Material' (to IWRG). Waste ASS makes up only around 15 per cent of the total spoil, where the majority of this is estimated to come from the Edithvale Project.

The risks associated to human health and the environment, taking account of expected: assessment, monitoring, management and mitigation measures for the Projects, defines all the risks associated with ASS (except one, discussed below) as negligible. This is due to the Projects being designed, to minimise the disturbance and activation of ASS. Containing perimeter pile walls are to be placed prior to trench excavation. Trench excavation is planned to occur in a relatively rapid time frame compared to that required to activate the types of ASS present. Stockpiling of disturbed soils at the surface is to be avoided, where rapid load–out of excavated soil is to occur to pre–arranged and approved receival points (who will deal suitably with PASS or ASS as received). An overarching set of Monitoring and Management Plans will be incorporated into the detailed design, to address spoil management, PASS or ASS and general sound construction techniques in line with regulatory and industry guidance.

There is one risk aspect which was assessed in the EES as minor. This is the risk of acidification associated with drawdown of groundwater levels, either across the construction

or operational phases of the Edithvale Project (for the Bonbeach Project, the same risk aspect level is rated as negligible. The mitigated assessment for the Edithvale Project (assuming the passive horizontal sub-surface drain, or a similar approach), reduces this risk rating from minor, to negligible.

The IAC considers that EPRs CL4 and CL5 adequately address the issues raised by the Friends of Edithvale Seaford Wetlands, based on the understanding that appropriate arrangements will be made for long-term permitted disposal of waste water from the project, such as to an external sewer system under a Trade Waste Agreement.

The IAC accepts that EPRs CL1, CL2, CL3, CL4 and CL5 (as modified by LXRA) adequately address risks associated with acid sulfate soils. No further changes to the EPRs are recommended.

7.7 Findings

The IAC makes the following findings in relation to ASS:

- **The amount of site investigation and associated laboratory analysis across PASS or ASS and associated groundwater investigation in the EES is considered suitable at this stage of the Projects development.**
- **The proposed EPRs that deal with PASS or ASS and groundwater acidification effects are considered satisfactory. Frequent monitoring, re-modelling, expert review and adjustment measures are expected to be required through the detailed design and construction phases. The involvement of the expert peer reviewer forms an important part of this checking process.**
- **The Projects will be able to prevent adverse environmental or health effects resulting from disturbance, storage or changes within the groundwater regime that may result in the acidification of soil and groundwater. Excavation of this material will be conducted using suitably defined and established practices.**
- **Early planning with the relevant sewer authority (South East Water) is encouraged, when considering any option of the long–term permitted disposal of waste waters from the Projects, to an external sewer system under a Trade Waste Agreement.**
- **The IAC generally agrees with the key finding of the EES that the overall risks of ASS and contamination from the Projects are manageable.**
- **The EPRs relating to acid sulfate soils are considered satisfactory, and the IAC makes no recommendations for further changes beyond those proposed by LXRA.**

8 Groundwater quality

8.1 Background

Chapter 5.3.7 of the EES (Vol 1), detail issues related to groundwater quality. Chapters 7.3.2 and 7.4.2 of EES (Vol 1) detail issues relating to groundwater contamination. Technical Report A on Groundwater in EES (Vol 2) covers groundwater contamination. ASS impacts to groundwater are covered in Technical Report C, EES (Vol 3).

A background description related to the Projects hydrogeological setting is provided in Chapter 6. Results of soil drilling and groundwater monitoring investigations across ASS and contamination are covered in Chapter 7.

The EES provides detailed descriptions of the QA and UTAF aquifer systems, which may have their groundwater quality impacted from the Projects. Key features of these aquifer systems include:

- Quaternary Aquifer (QA): recent sediments across lower lying areas (former Carrum–Carrum Swamp) and subsequent deposits of aeolian dune sands. Groundwater most typically exhibits fresh water quality. However, it can also be brackish to saline, close to the Edithvale Wetland, where the wetland serves as a groundwater discharge feature. Within the QA, is a relatively thin (1.4 to 3.0 metres), low permeability Pleistocene Clay layer beneath the dune sands. This clay serves as a local aquitard, confining groundwater within the underlying Upper Tertiary Aquifer (UTAF).
- The UTAF tends to be either a semi–confined or confined, comprising of sands from the Brighton Group. This is a moderate to poor quality aquifer generally, up to 30 metres thick. Some zones of higher total dissolved solids (TDS) quality and higher water bore yield can be encountered within its coarser sand and gravel bands. The UTAF is considered to have some degree of hydraulic connection with the overlying QA, where there tends to be a general, but restricted downwards movement of groundwater to the UTAF.
- Between the Projects, the rail corridor sits atop a sand ridge formed of coastal barrier and dune deposits (matched to the QA). To the east of the rail corridor, QA groundwater flows are toward the Edithvale Wetlands and Wannarkladdin Wetlands, and to the west, groundwater moves west to south–west, towards Port Phillip Bay. At the southern end of the Bonbeach project area, due to the proximity of the Patterson River, groundwater flows for the QA are more to the south to south–west (towards the river). For the UTAF, general groundwater flow direction is predominantly west, to Port Phillip Bay, however a saltwater intrusion wedge associated with Port Phillip Bay is inferred to influence and push up UTAF groundwater, closer to the aquifer surface near the coastal dune ridge.
- Across the Study Area, groundwater recharge is primarily via rainfall, where the coastal sand ridge provides the dominant contribution.
- The Edithvale and Seaford Wetlands are two of the last few remnants of the once extensive Carrum–Carrum Swamp. These wetlands are now separated by the Patterson River, and have evolved into hydrologically engineered features, surrounded by extensive urban areas.

- Key receiving streams and waterways, include the Patterson River (southern boundary of the Study Area) and Mordialloc Creek (northern boundary of the Study Area). Centre Main Drain transfers surface water shedding from the east side of the rail corridor to either of these waterways.

8.2 What are the risks?

The Projects were considered at concept design phase, to have potential for significant environmental effect on the protected beneficial uses of groundwater, resulting from a change to the groundwater regime, coupled with other risks to human health, recreational use of waters and surrounding ecosystems. Potential groundwater quality impacts include:

- Long term effect of a saltwater intrusion layer from Port Phillip Bay, pushing further landward and upward, towards the upper aquifers, increasing shallow aquifer salinity and impacting on beneficial groundwater use
- Excessive groundwater mounding from 'aquifer damming', changing the water quality regime for the Edithvale Wetlands and Wannarkladdin Wetlands
- Activation of PASS and ASS soils with the Projects, across construction or operational phases (Chapter 7)
- Groundwater contamination migration exacerbation across construction or operational phases:
  - The mitigated treatment proposed for the Edithvale Project may increase and facilitate groundwater and contamination movement (for example, the passive sub-surface drain, or similar)
  - The Bonbeach Project, where the groundwater regime will be subject to some amount of alteration, in terms of aquifer drawdown and alteration to shallow aquifer flow patterns close to the Project Area
  - Such above aquifer alterations may result in the inhibition for certain land uses or future land developments, due to resulting groundwater contamination presence, on or close by to the land (such as aspects of associated chemical vapour intrusion from organic contaminants)
  - Impacts on beneficial uses – e.g. water quality in bores.

8.3 EES response

8.3.1 General

Groundwater was widely discussed in the EES, which applied the systematic, risk-based approach for risk assessment and estimation, including regional numerical groundwater modelling:

- Modelling of groundwater and surface water bodies was mainly related to the prediction of changes to groundwater level and flows
- A limited amount of local and simplified groundwater modelling was applied to the situation of a coastal saline intrusion wedge being exacerbated by the Projects.

Groundwater sampling and analysis was generally undertaken between March 2016 and June 2017 (included results from the broader Cheltenham-Frankston rail line area). This totalled 39 groundwater monitoring bores across various studies:

- 20 of these bores related to investigations targeting Edithvale ('ID18' series bores)
- 12 of these bores related to investigations targeting Bonbeach ('ID46' series wells).

An independent peer review of the EES studies was conducted by Dr Tony Smith (Principal Modeller with CDM Smith), where the outcome of this review was included as Appendix I to Technical Report A (this review covered groundwater modelling and associated technical studies). Further discussion on this is provided in Chapter 6.

8.3.2 Risk and impact assessment – without mitigation measures

A series of predictive groundwater models were used to initially appraise the unmitigated approach for the construction of the trenches. This better-informed the risk appraisal process.

8.3.3 Groundwater usage and key regulatory drivers

Groundwater salinity across the shallow aquifers is spatially and, most likely, temporally variable. EPA require a conservative approach when considering protection of beneficial uses related to groundwater and linked surface water quality. This is defined in terms of total dissolved solids (TDS) (SEPP–GoV), where receiving surface water bodies linked with groundwater contribution, requires consideration for the protection of ecology linked to those water bodies to be guided by SEPP–WoV. When considering groundwater usage in the Study Area, generally, the QA was taken as fresh water quality.

The EES reported that searches of available published databases for registered groundwater bores through the Study Area identified 51 registered bores:

- 20 of these reported as being installed for groundwater investigation or observation purposes only (installed to typical depth range: 8 to 9 metres below ground surface level (BGL), or a depth range of 16 to 17 metre BGL), within either the QA or UTAF respectively
- Two of the bores were State Observations Network bores, placed to significantly greater depth
- None of the bores were documented as being installed for industrial or commercial use
- A total of 38 of the bores (75 per cent) were listed as being registered for either stock or domestic use, where typical bore depth was 7.0 metre BGL – within the QA (suggested average bore yield was around 0.4 L per second)
- For Bonbeach, the EES outlined field-based observations that numerous properties within the area of Ti Tree Avenue may be using bores for garden irrigation, even though these did not appear across registered bore lists.

The EES, when considering groundwater quality and related beneficial uses, conservatively adopted 'Segment A1' for the range of groundwater beneficial uses to be considered (for both upper aquifers: QA and UTAF). Potential beneficial uses are listed in Table 2.

8.3.4 Baseline water quality at groundwater receiver/extraction Points

Groundwater investigations involved taking 23 primary groundwater samples from monitoring bores (11 for Edithvale and 12 from Bonbeach) across two time periods (a limited number in December 2016 and a larger number across July 2017).

Table 2 Applicability of groundwater beneficial use for 'Segment A1' groundwater[86]

Beneficial use	Comments on relevance of beneficial use
Maintenance of Ecosystems (at point of groundwater flux discharge to receiving surface water body)	Both freshwater and marine ecosystem guidance may apply.
Potable Water – Desirable	The EES questions relevance of the groundwater for potable water supply: The area is highly urbanised. Typical bore yields are low. There is widespread availability to a reticulated water supply.
Potable Mineral Water Supply	There are no known or documented mineral or spring groundwater sources in the Study Area.
Agriculture, Parks & Gardens (Irrigation)	Known uses of urban garden or backyard watering in the local area, via shallow water bores (often placed as an unregistered 'spear–point' water bore).
Stock Watering	
Industrial Use	Expected bore yields are considered too low to maintain water yields required for reliable commercial or industrial purposes.
Primary Contact Recreation (for example; bathing, swimming)	Relevant.
Buildings & Structures	Relevant.

Shallow groundwater for the Project Areas shows signs of some existing acidity, but there is sufficient ability for the groundwaters to self–neutralise any acidity normally produced from disturbance.

The Edithvale Wetlands contain a range of inter–connected wetland types, including shallow freshwater marsh, permanent open freshwater wetlands and brackish to saline water ponds. Sporadic surface water quality monitoring by Melbourne Water has been conducted since 2009:

- Those wetland cells that receive direct stormwater inputs (ES1 and EN3A) show higher water turbidity and dissolved nutrient results, but exhibit lower salinity compared to the other cells. Cell EN3A showed the freshest water, matched to the EES understanding of stormwater inputs to the cell from surrounding residential development
- Studies of cells EN2 and EN3, suggest that the former Pleistocene clay layer has been breached by human engineering works in the past, where these cells show higher salinity, due to an increased connectivity with more (naturally) saline groundwater sourcing from below.

86 Source: Drawn from EES, SEPP–GoV and IAC Hearing contributions

8.3.5 Salinity alteration from aquifer mounding and damming

With groundwater mounding from aquifer damming, the reappraised mitigated treatment risk estimate, of groundwater mounding causing a change within the existing hydraulic or water quality regime at the Edithvale Wetland was reassessed in the EES as 'negligible'. There is a predicted negligible effect from the Project on water quality, relative to the existing variability in surface water flows, levels and quality for this wetland.

8.3.6 Saline wedge Intrusion

The EES presented bore field salinity profiling in relation to the Edithvale Project, which confirmed the inferred Site Conceptual Modelling relation to the presence of a saline water wedge. The piled rail trench is anticipated to result in 'aquifer damming', with groundwater mounding up-gradient and drawdown down-gradient of the trench. Groundwater modelling of this effect on potential for increased push-up of a saline wedge intrusion, sourced from the coast was undertaken, on basis of conservative design scenarios (including the initial assessment scenario and assumed long runs of completely water-tight, deep piled walls).

Groundwater salinity increase may impact upon groundwater beneficial uses (Section 8.3.3). Such manipulated anthropogenic change is termed 'pollution' under the *Environment Protection Act* and related policy. Modelling for the more sensitive QA with respect to salinity and beneficial use suggested:

- Groundwater drawdown from aquifer damming on the west side of the trench has potential to result in an upwards movement of the saline wedge, but in the short term, this wedge interface movement is expected to be subtle. Changes in salinity from the Projects for the shallow aquifers are expected to occur slowly and may not be discernible for several years, to decades, with the model results showing ongoing increases in level of impact over the 100 year modelling timeframe
- At the up–gradient, east side of the trenches localised decreases in shallow aquifer salinity are estimated to occur with time (within 400 metres of the trench)
- Estimated impact on a local, hypothetical shallow groundwater bore user, within the down–gradient influence zone of the trench, is expected to not be discernible to a bore user, given the relevant scale of other TDS influencers for the area
- The effects of saltwater intrusion changes from climate change (sea level rise of 0.8 metres and reduced local aquifer recharge by over 50 per cent) were modelled. These influences were noted to also potentially increase shallow aquifer salinity for the same locality, particularly over the longer-term (100 years).

Risk to the Edithvale Wetland from localised salinity reduction of shallow groundwater east of the Project rail trench was estimated as negligible (where the more conservative, initial assessment was modelled, as opposed to the mitigated assessment). In their natural state, the Edithvale Wetlands were freshwater wetlands.

Modelling for future effects of climate change showed that without the Projects, salt water intrusion effects may still cause future increases to TDS.

The EES suggested that the applicability of the beneficial use 'potable water supply' as described by Segment A1 and A2 water (within SEPP–GoV) could be questioned for the local area, given its urban setting. Expected low QA residential bore yields and available access of reticulated water for the area, suggests bore users may not be using groundwater for human drinking consumption.

Risk to groundwater users from salinity increases associated with saline wedge intrusion and alteration from the mitigated Edithvale Project aquifer damming were considered in the EES as negligible. The EES indicated that, for the Bonbeach Project, a similar negligible risk estimation applies.

8.3.7 Contamination transfer

The main risk with respect to land contamination is associated with groundwater contamination, where two main physical forms (or 'phases') within the sub-surface may apply:

- Non Aqueous Phase Liquid (NAPL), can take the form of a Light Non Aqueous Phase Liquid (LNAPL), with a fluid relative density of less than 1.0 (atop the groundwater), or a Dense Non Aqueous Phase Liquid (DNAPL), with a fluid relative density of greater than 1.0. Within the sub-surface, NAPL can dynamically partition and contribute chemical mass across the various physical media phases: groundwater (dissolved phase), vapour phase and adsorbed phase
- Dissolved Phase contaminant impacts may be derived from chemical partitioning across: NAPL, adsorbed phase, or vapour phases within the sub-surface.

For the Bonbeach Project, the EES investigations suggest only a small number of potential land contamination sources may occur within the areas that may be affected by groundwater drawdown or mounding.

For the Edithvale Project, investigations indicate a high probability that groundwater contamination will be encountered, where contamination has been already identified in some areas, considered likely to be affected by some amount of groundwater alteration.

8.4 Evidence and submissions

LXRA submitted evidence on the modelling of general groundwater processes and its related impact assessment from Mr Cauchi, Mr Chan, Dr Smith, Mr Murphy and Mr Stuckey. In relation to groundwater quality:

- Mr Cauchi gave evidence that, for the Edithvale Project mitigated design assessment, the passive horizontal sub-surface drain is one engineering option, likely of many, which could effectively reduce groundwater level changes, thereby limiting respective changes to groundwater quality
- Mr Chan concluded that the passive horizontal sub-surface drain mitigation option for the Edithvale Project would provide an effective solution
- Mr Mark Stuckey of Environmental Earth Sciences gave evidence, where he acted in the role of independent peer reviewer across aspects of land contamination and ASS for the Projects. Mr Stuckey concluded that for the consideration of ASS and related groundwater acidification and groundwater contamination impacts from the Projects, the EPRs were appropriate for fulfilling suitable mitigation and management of the potential effects.

Council also submitted evidence to the IAC on groundwater quality:

- Dr Andrei Woinarski of Senversa provided evidence across the fields of hydrogeology and ASS. Dr Woinarski concluded that "*none of the identified issues would prevent the construction of the level crossings at Edithvale or Bonbeach*".
- Mr Piper concluded with respect of contamination, that further assessment of potential sources and specific contaminants needed to be undertaken with detailed design. Mr Piper concluded "*none of the identified issues would prevent the construction of the level crossings at Edithvale or Bonbeach and can be all addressed during the detailed design*".

Council's submission supported the proposed mitigation measures for the Project(s). Council noted that further groundwater and soil investigations across identified contamination aspects will need to be undertaken. Council raised a concern on how surrounding land owners were to be notified of any potential contamination identified through the course of the Projects. They asked for an additional EPR, to address the communication of detected contamination issues to land owners, as identified on their land (whether as a pre–existing state of contamination, or as an outcome from the Projects, or which may be intersected through such land owners using groundwater bores).

EPA requested plans, related to monitoring and mitigation of groundwater mounding and drawdown, including updated modelling of as–deployed or proposed mitigation measures, with details of related assessment and monitoring measures (for example: time scale, trigger levels and proposed mitigation actions). EPA requested that it be able to review and comment on such plans. EPA expects that additional, more-detailed groundwater investigations will be undertaken and contributed to the Groundwater Management and Monitoring Plan. This plan should include details of contingency measures should final chosen management or mitigation actions not perform as intended. EPA requested that further site–specific data be collected across: groundwater quality, groundwater levels, groundwater flow velocity and flow direction, with the establishment of a suitable baseline condition for these parameters before the Projects construction. EPA also requested an independent peer reviewer, or an independent Environmental Auditor to be used, to review development of proposed mitigation measures for the Edithvale Project, advise across risks, compliance and to provide further comment on the Groundwater Management and Monitoring Plan.

Mr Ross Macfarlane (Submission 2), Ms Jessie Lopez (Submission 121), Ms Francis Williams (Submission 147), Friends of Edithvale-Seaford Wetlands (Submission 213) and Kingston Residents Association all raised concerns about the effects of aquifer damming and reliance on the mitigated solution for the Edithvale Project:

- Mr Ross Macfarlane suggested the passive sub-surface horizontal drain mitigation concept was not a proven technology for sands, where there may be concerns regarding drain clogging with time. He requested that alternative groundwater drainage and equalisation measures also be considered
- Mr Francis Williams raised concerns about potential impact to the use of groundwater bores at the area of Ti Tree Avenue. He submitted that both they and surrounding neighbours regularly use extracted groundwater for backyard garden watering
- Friends of Edithvale–Seaford Wetland expressed concern over potential alteration in groundwater flow patterns and quantities, and how this may impact upon the

wetlands. They expressed concern over the mitigated solution for the Edithvale Project and the heavy reliance of groundwater modelling with the risk assessment
- Mr James Walker (Submission 216) expressed concern over a possible change in groundwater quality for discharges into Port Phillip Bay and surface waters eventually discharging to the bay, and its combined impact on seagrass beds.

8.5 Monitoring and mitigation

Contamination transfer

LXRA submitted that although there was a notable risk in encountering groundwater contamination for the Edithvale Project, the associated risks can be managed through the proposed EPRs.

EPRs GW3 and CL5 propose a monitoring program and mitigation framework, to manage risk of contaminated groundwater and its uncontrolled transfer across land. These EPRs would provide for the early detection of any contamination mobilisation and migration.

Mr Stuckey provided evidence that the level of investigation for the Projects' development stage was appropriate to form a suitable appraisal of risk, where proposed EPRs would provide for suitable management of contamination risks across construction and operation.

Mr Piper in his evidence, noted that further work on contamination investigation and risk appraisal and management would be required across detailed design.

EPR CL4 requires:
- Completion of a baseline groundwater quality assessment (at least three-months prior to the commencement of construction)
- Implementation of a system, to manage and dispose of intercepted groundwater from the Projects (if required)
- Collection, treatment, disposal and handling of contaminated groundwater and or slurries, including vapours
- Monitoring of intercepted groundwater quality during construction, with water quality monitoring at run-off containment areas
- The implementation of groundwater contamination plume management (if required)
- Treatment and monitoring of impacted groundwater (including vapours), prior to disposal, to the requirements of the relevant authorities.

EPR CL4 acts as an overarching requirement; all the management and mitigation measures listed above are to be in accordance with the key related SEPPs, Water Industry Regulations 2006 and relevant EPA regulations, standards and guidelines.

EPR GW3 requires:
- The Groundwater Management and Monitoring Plan to be prepared to the satisfactory review of EPA and other relevant authorities. This plan is to include detailed monitoring requirements and to set clear trigger levels for action across groundwater levels and ground water quality
- That further site–specific groundwater data as collected, will be contributed for the continued development of the Groundwater Management and Monitoring Plan.

EPR CL5 sets the requirement for a Groundwater Quality Mitigation Plan, to be prepared in consultation with the applicable Manager of the affected land parcel, for management and mitigation of any negative impacts resulting from changes to groundwater quality and or groundwater levels from the Projects. This plan is to be prepared prior to the handover of the constructed asset to the rail infrastructure Asset Manager. The plan is to cover:

- Measures to manage negative impacts to the beneficial use of groundwater (which includes water quality) caused by contaminated groundwater transfer or plume migration attributable from the Projects, so that existing beneficial groundwater uses are maintained (EPR CL5 also specifically addresses impacts from PASS and ASS – refer to Chapter 7)
- Measures to manage negative impacts to the beneficial use of groundwater, caused by changes to groundwater salinity attributable from the Projects, such that existing beneficial groundwater uses are maintained
- Identifying any entity or entities who will be responsible for the implementation of any required management or mitigation measures
- The Groundwater Quality Mitigation Plan (EPR CL5) must be implemented if defined trigger events or levels as set out within the Groundwater Management and Monitoring Plan (EPR GW3) are flagged from monitoring observations.

Saline intrusion effects to groundwater

Implementation of EPRs GW2 and GW3 are considered to suitably address the risks of increased saline wedge intrusion to groundwater quality to a negligible level.

8.6 Discussion

General

EPR GW3 requires that the Groundwater Management and Monitoring Plan will be prepared to the satisfaction of the EPA. EPR GW4 requires that this plan will be subject to independent peer review by an appropriately qualified specialist.

Contamination transfer

EPRs CL2 to CL5 set out requirements to minimise the risk of contaminant transfer due to the Projects, including contaminant transfer as a result of groundwater regime change. The IAC notes that while there may be some alteration to groundwater quality in respect of contamination (groundwater is a relatively dynamic system), these alterations are expected to be localised, temporary and in most cases generally reversible upon detection, if requiring mitigation.

EPR GW2 requires the Projects to be designed and operated, such that changes to the groundwater regime do not result in degradation to groundwater quality from groundwater contaminated plume migration, which would preclude beneficial use. The IAC prefers Council's proposed version of Clause (c) in relation to EPR GW2, from their submitted Document 35. This is because it includes reference to 'land use' (particularly when considering soil vapour impact to land, associated with contamination and influenced migration via groundwater from the Projects).

Saline wedge intrusion effects

In the absence of mitigation, the Edithvale Project is expected to have significant impacts on groundwater levels and flows, producing some consequential impact from saline intrusion (rated in the EES as a moderate risk). With mitigation measures (e.g. passive sub-surface horizontal drain), the EES predicted that the risk can be significantly reduced. The Bonbeach Project is expected to have lesser impacts on groundwater flows and levels than the Edithvale Project (without mitigation), based on the inferred direction of groundwater flow and anticipated trench pile wall geometry.

The EES presented a simplified saline intrusion model, which indicated that changes in water table salinity at Bonbeach may be in the order of 250-300 mg/L over 100 years, compared with 500 mg/L in the unmitigated scenario at Edithvale[87]. The model predicted that the saline intrusion response to groundwater drawdown would be slow.

Understanding the likely long-term response of groundwater salinity change due to aquifer damming is important, as this may impact on the dependent biodiversity sited above these areas. These continuing, subtle alterations to groundwater salinity can also prove difficult to detect from monitoring, given the wide range of natural and anthropogenic variations to salinity which are possible for these aquifers.

EPR GW2 requires the Projects to be designed and operated such that changes to the groundwater regime do not result in degradation to groundwater quality to an extent that would preclude beneficial use of the groundwater.

EPR GW3 requires the establishment of a Groundwater Management and Monitoring Plan across both groundwater levels and quality, to allow detection of any changes to these parameters.

8.7 Findings

The IAC makes the following findings in relation to groundwater quality:

- **The groundwater modelling for the EES provides an adequate basis for supporting the assessment of potential impacts of the Projects on water quality at the concept design phase.**
- **Changes in groundwater flows resulting from the Projects lead to the risk of contaminant transfer. There is higher potential for migration of existing or future contaminated groundwater to occur with the Edithvale Project. Several the EPRs (including CL2 to CL5 and GW2) satisfactorily address this issue and will reduce the risk of contaminant transfer associated with the Projects.**
- **Increased saline wedge intrusion from Port Phillip Bay is expected to occur in response to groundwater drawdown resulting from the Projects. The EES predicts that without mitigation measures (e.g. passive sub-surface horizontal drain), the Edithvale Project would lead to a moderate increase in water table salinity but indicated that mitigation measures would reduce this to a negligible level. There is also predicted to be a small increase in water table salinity (without mitigation).**
- **For the Edithvale Project, if the mitigated treatment approach using a passive sub-surface horizontal drain (or similar) is adopted, groundwater quality from both**

[87] Technical Report A, Appendix F p28

the up-gradient and down-gradient portion of this drain should be regularly monitored and tested as a part of EPR GW3.

- **EPRs GW2 and GW3 should be adjusted as shown in Appendix E to reflect the IACs findings.**

9 Surface water

9.1 Background

Chapter 2.5.5 and 2.6.5 of the EES (Vol 1) details issues related to management of surface waters. Technical Report E on Surface Water Impact Assessment is found in EES (Vol 2).

The Project works are not within the extent of existing, known flood zones. Surface water run-off will be managed across both construction and operation, such that surrounding existing flood levels and drainage infrastructure are not adversely impact by the Projects.

9.1.1 Existing conditions and current drainage networks

There is no immediate, formal drainage network for surface water flows within the existing rail corridor, located at the top of a sand dune ridge, above both Station Street and Nepean Highway. Run–off from the rail corridor flows to the adjacent road networks and eventually to Council's drainage network (both east and west):

- To the east, via surface drainage flows and through Council's drainage network, with eventual end-point flow of water to the Melbourne Water–owned linear drainage reserve (Centre Main (or 'Swamp') Drain). Centre Main Drain is a seven kilometre drainage reserve, running north-south, at the immediate west side of the Edithvale Wetland and Wannarkladdin Wetlands. For low flows, stormwater overflows do not normally discharge to the wetlands. The only way for these flows, originating from Station Street, to mix with wetlands water, is during an extreme stormwater event (when the entire local floodplain can become inundated)
- To the west, into the Nepean Highway road corridor, drainage networks are generally minor in scale, where they outfall to Port Phillip Bay. Very little cross-drainage is expected in this direction from the Projects.

Council information shows considerable areas to the east of Station Street are identified as being impacted by frequent surface flooding and overland flows. Council is responsible for the existing stormwater infrastructure east of the rail corridor, where a permit is required for any proposed Project connection to these drainage assets. Council advised that it cannot accept any increase in surface water flows into their drainage network. Any increased flows would need to be mitigated, as most of the existing drainage assets are of limited spare capacity (remaining portions from the original network, are circa 1960's).

Council, upon IAC request, provided additional information on drainage infrastructure near the Project Areas:

- Council has installed some relatively new works for drainage, where these have been directed at relieving local road surface water ponding (Figure 7). Council indicated that these new installations have not been directly intended to seek relief from soil water logging of local lands
- Historically with notable rainfall events, when Centre Main Drain ran full (frequently), surface water would back–up into Council's local drainage system, at the lower–lying foreshore side (west) of Centre Main Drain. This has caused frequent water ponding throughout the local road network (particularly at Chelsea, Edithvale and Bonbeach)
- In 2010, Council initiated a mitigation study, working with Melbourne Water, to deal with high–flow stormwater events. A preferred solution was selected which

'surcharges' water (provides additional water load) from the local drainage catchments into Centre Main Drain (to the channel feature, for high–flow events). The Fraser Road residential catchment at Edithvale was the first completed project of this type by Council (Figure 7)

- For the Bonbeach Project, Council does not have any formal stormwater control and harvesting system at this stage, although a future system is proposed for Bondi Road and Scotch Avenue (Figure 8)
- Melbourne Water does not have any formal stormwater harvesting schemes from their drainage assets in the area. Rosedale Golf Course (located some 600 metres north of Edithvale Road) is known to currently divert some 40 ML of water from Centre Main Drain, where the EES indicates it would not be impact by run-off from the Projects.

9.1.2 Proposed drainage network

For Edithvale, Council's ultimate drainage layout – Figure 7 (comprising of both newly-constructed pipes and to be constructed pipes) is expected to include up to 1.6 kilometres of stormwater drainage lines, up to the intersection of Station Street and Bayside Avenue. This drainage line runs into the pumping station invert level of -6.55 metre AHD (located at the Chelsea Golf Course Carpark).

Figure 7 Edithvale Project – surface water drainage scheme (Source: Document 23, Council)

Figure 8 Bonbeach Project – Surface water Drainage Conceptual Scheme (Source: Document 24, Council)

9.2 What are the risks?

Identified risks include:

- Increased amount and more concentrated discharge of collected stormwater from the rail trenches, could place extra water load to the surrounding drainage networks, resulting in extra flooding and land waterlogging
- Contaminated waters from either: silt, acidification effects, or from other nearby contamination sources, could be encountered across both construction and operational phases
- Additional water and contamination loads to stormwater may come from the rail trenches with the operational phase, from an increase in station box impervious surfaces exposed to rainfall.

9.3 EES response

LXRA undertook impact assessment studies in relation to surface waters for the Projects. The assessment was informed through technical investigations, based on 'desk-top' appraisal of existing flooding and drainage conditions, where review included:

- Special Building Overlays and Land Subject to Inundation Overlays from Council Planning Schemes
- Council flood mapping records
- Records for the drainage assets for VicRoads and Council
- Available local topographical information.

The aim of the assessment was to understand whether standard engineering principles can be applied to mitigate possible adverse impact to surface waters. LXRA noted that deployed surface water management options would be developed in close consultation with Council and Melbourne Water through the detailed design.

Data review showed that overland surface flows or underground drainage lines currently do not cross the rail corridor for the Projects. Therefore, risk of disrupting existing stormwater networks or overland flow paths from flooding was considered minimal:

- The EES considered the potential of the planned removal of two vehicular level crossings and their impact to surrounding drainage networks and the eastern floodplain (termed as 'cross-drainage design' for both construction and operation). The initial review was conducted due to the probable collection of surface waters from the Projects, where collected water dispersal was likely to occur at a more concentrated point of discharge
- Through the tanking of the base of the rail trench and its side-walls, some increase in the amount of surface water run–off from each Project Area could be expected.

For the operational phase, there are several available solutions for the disposal of collected stormwater from the trenches, where these would not direct additional flows as a flow-rate increase to the drainage network, or would not result in more frequent flooding of the road network or result in increased local flood levels. Prior to discharge to a receiving local drainage system or waterway, collected stormwater from the trenches would be dealt with, via a Stormwater Quality Treatment Strategy, to reduce suspended solids, nutrient loadings and other pollutants to meet requirements of *CSIRO (1999/2006) Best Practice Environmental Management Guidelines 'BPEM' – Urban Stormwater*.

In considering climate change effects, influences of rainfall intensity changes and sea level rise were considered:

- A 19 per cent increase in rainfall intensity matched to Year 2100 was considered for climate change, and its impact on the standard of flood protection for the rail corridor, adjacent road assets and other properties as part of the cross-drainage design. An assumed 0.8 metre increase in sea level rise for year 2100 was evaluated
- No existing surface water flow paths or significant existing drainage infrastructure were deemed to cross the Project Areas. For the two proposed level crossing removal sites located at the top of the drainage catchment, adjacent surface water characteristics at the Projects will not alter under climate change (although an increase in surface water run-off may occur via increased rainfall intensity)
- Increased capacity is to be provided with design, through provision of improved drainage connection (larger diameter cross–drainage pipes), on-site storage of water within the rail trenches and increased 'free-board' allowance for water levels
- An assessment of existing flood events and local topography showed that whilst increased rainfall intensity in the future would increase nearby flood levels, for the neighbourhood, they will not impact upon those flood flow paths that interact with the Project Areas. As such, flood modelling for further quantification of the effects of the Projects on drainage and flooding, with climate change considered, was not required.

Key regulatory controls across surface water quality are sourced from two key controlling documents:

- SEPP-WoV. This policy contains catchment-specific schedules for Port Phillip Bay (the ultimate drainage receptacle for flows either east or west of the rail corridor)
- CSIRO (1999/2006) BPEM - Urban Stormwater.

Construction aspects related to surface water are discussed in Chapter 13.

Stormwater collected from the operational rail trenches, with some limited amount of groundwater seepage, is intended to be removed via a permanent water storage-surge capacity and pumping system. From this storage, water flows would be directed to a single

receiving location outside of each rail trench. Currently, a range of potential design options, that can be used in conjunction with each other or separately, are available for collected water management:

- Utilising the 1 in 100 Year, two–hour underground water storage back–up (storage of 800 m^3 built into each rail trench, to detain water run-off and pump-out water following a storm event), at a discharge rate to be agreed with Council. Design of this surge storage would also allow for the potential increase in rainfall intensity from climate change
- Provision of an alternative water outfall, east of Centre Main Drain (with treatment regime), effectively bypassing Council's drainage network
- Providing a rising main connection along the rail alignment to transfer waters from both Projects; to discharge stormwater directly to the Patterson River under a permitted water treatment regime.

All these potential design options are expected to require close liaison with both Council and Melbourne Water.

The EES found that all risks were negligible when considering construction and operational aspects, assuming the EPRs are implemented.

Plans for suitable management and mitigation, as proposed by the EES for construction are discussed in Chapter 13.

Plans for management and mitigation for the operation phase include:

- EPR SW2: Sets Water Sensitive Urban design (WSUD) and integrated urban water management principles for the Projects' stormwater management system
- EPR SW4: Sets the control of water disposal quantity and quality from the rail trenches following a storm event, where no adverse impact is to occur to the drainage networks in consultation with Council and Melbourne Water
- EPR SW6: Sets the control against operational dewatering and pumped water quantity disposal from the rail trenches, such that there are no increases in flooding (flood levels, flows and velocities), where compliance is called up with Council and Melbourne Water.

The EES states that through these controls and with Council compliance, dewatering of the trenches following storm events is unlikely to result in a reduction in the capacity of the local stormwater drainage system (causing flooding). Surface water quality will be controlled through the need for compliance to be met to both SEPP-WoV requirements and that of Council and Melbourne Water.

9.4 Evidence and submissions

LXRA submitted that the local drainage authorities: Council, Melbourne Water and South-East Water will be closely involved in the final design for Project drainage aspects.

Mr Meyers from AECOM GHD provided evidence for LXRA across the surface water impact assessment.

Council submitted that a similar stormwater drainage storage, diversion and re-use system to the Edithvale Scheme is proposed in the future to service the drainage network for Bonbeach. The primary new piped storage line runs under Bondi Road, where it will both store and direct collected stormwater to a future drainage line, to run underneath the

sporting grounds at the south end of Scotch Parade, to a water treatment facility, adjacent to the west side of the Wannarkladdin Wetlands (see Figure 8).

Evidence on surface water issues called by LXRA was largely unchallenged. Apart from the submission by Council, a total of six other submissions were received relating to flooding issues, discharge of sewerage across flood events and concern about potential surface water flows into Port Phillip Bay.

EPA noted that in relation to EPR SW1 (Stormwater Management – Construction) and EPR SW2 (Water Quality Operation), the importance of key guidance documents:

- Australian Rainfall and Run-off and Australian Run-off Quality Guidelines
- EPA (1996) Publication 480
- CSIRO (1999/2006) BPEM - Urban Stormwater.

Chelsea Bonbeach Train Station Group expressed concern about flood issues and the potential impact to residential housing and vegetation matched to the Projects development.

Port Phillip Conservation Council expressed concern regarding trench construction potentially altering water flow patterns and the related volume and direction of groundwater flows, to both the Edithvale Wetlands and Bonbeach foreshore. It expressed concern about surface flooding for the area, suggesting that at times, sewerage releases into surface waterways may be occurring. The submitter asked how sewerage was to be managed in general and during flood events, given the construction type and scale of the trenches.

Mr Chris Visser (Submission 36) raised concerns regarding flooding and Project(s) effects.

Mr James Walker expressed concern in relation to general 'water flows' to Port Phillip Bay and potential impacts to seagrass beds. The submission requested that allowance be made for compensatory adjustment of the natural state of water flows, to assist with the amelioration of impacts from urbanisation and related infrastructure.

Friends of Edithvale Seaford Wetlands expressed concerns in relation to the water quality of stormwater discharges. They submitted that the criteria specified in EPR SW1 were too lax and requested that EPRs SW1 and SW2 be amended to include more specific requirements regarding discharge quality for stormwater discharges[88].

9.5 Monitoring and mitigation

EPRs associated with construction for the Projects are discussed in Chapter 13.

EPR SW2 relates to the operational phase. The Projects design and operation (working in consultation with Council and Melbourne Water) must:

- Comply with SEPP-WoV when implementing a water collection and treatment system for discharge of treated water to other surface waters or drainage systems. This protects against potential impact to beneficial uses of receiving water bodies
- Adopt WSUD and integrated urban water management principles into the design of the stormwater management system, which includes key guidance documents:
  - LXRA's Urban Design Framework and related specific Urban Design Guidelines

[88] Friends of Edithvale Seaford Wetlands, Hearing Document No. 26, p 24.

- CSIRO (1999/2006), BPEM – Urban Stormwater.

EPR SW4 requires design of the surface water discharge from each Project to pose no adverse impact to the adjacent drainage networks (requiring consultation with Council and Melbourne Water).

EPR SW6 relates to maintaining levels of flood protection. It requires existing levels of protection associated with overland flow paths to be maintained (considering flood levels, flows and velocities), where Council and Melbourne Water must be consulted with for compliance.

9.6 Discussion

Potential impacts during construction relate to:

- Run-off containing high sediment loads and other pollutants being discharged from the Project Areas to trench dewatering
- Run-off from construction and laydown areas (Chapter 13).

Due to the location of the rail corridor at the top portion of the local drainage catchments, there is a minimal existing amount of formal stormwater drainage network within the immediate locations of the Project Areas.

Review of flood overlay information and topographic data shows where rail trenches are planned and level crossings are to be removed, the risk of interruption to existing drainage networks or overland flow paths is minimal. Council has indicated there is insufficient flow capacity in their existing drainage network to cater for additional flows, where any suggested increases to the drainage network must be mitigated.

At the two locations for level crossing removal, the Projects may impact the surrounding drainage networks and adjacent local flood plain across both construction and operational phases, where collected surface water runoff from each Project may be concentrated, as it is collected and pumped to a point of discharge. Tanking of the rail trenches may also increase some amount of surface water run-off and pollutant load into the operation phase.

The EES points to a range of potential solutions to manage surface stormwater with the Projects across the construction and operational phases:

- It points to standard and well accepted engineering treatment principles to manage and mitigate stormwater quantity and quality risk
- A strong compliance requirement is set by the EPRs, where final stormwater management options must be developed in conjunction with Council and Melbourne Water
- The EPRs provide the ability for LXRA to integrate its finalised Stormwater Treatment Strategy within other stormwater management strategies as developed through other authorities (such as Council).

The EPRs related to construction are discussed in Chapter 13. EPRs related to the operational phase, allow for a range of potential solutions for the disposal of collected surface water from the Projects, such that they would not direct additional flows to the drainage networks in time of storm events, cause more frequent flooding of the road network, or increase local flood levels to land.

A Stormwater Treatment (Quantity and Quality) Strategy needs to be developed for the Projects' design which:

- Draws upon the control methods for water quality set by: CSIRO (1999/2006), BPEM – Urban Stormwater
- Adopts WSUD and integrated urban water management principles, including the guidance suggested within LXRA's Urban Design Framework and related specific Urban Design Guidelines
- Provides for active consultation, collaboration and compliance through the key water authorities: Council and Melbourne Water (and possibly others).

Pollution from urban stormwater (increased nutrients, sediments and toxicants) has been identified as a threatening process in the Edithvale-Seaford Wetlands Ramsar Site Management Plan prepared by Ecology Australia (2016), which was tabled by LXRA at the Hearing. To ensure that the Edithvale and Wannarkladdin Wetlands are protected from pollution arising from stormwater discharges associated with the Projects, implications for the Wetlands should be considered in the development and implementation of stormwater management measures, both during construction and in the operational phase.

9.7 Findings

The IAC makes the following findings in relation to surface water:

- **Construction risks can be suitably managed through application of the EPRs, which call-up guidance and use of mitigation and monitoring methods described in the key document: EPA (1996), Publication 480 and consultation with Council and Melbourne Water.**
- **There are several potential solutions for stormwater disposal from construction areas, such that additional flows of water to the drainage network are not sent at inappropriate times (during extreme rainfall events), causing more frequent flooding of road networks or local flooding.**
- **Operational risks can be managed by adopting stormwater management techniques to ensure there is no increase in flood levels which could impact on other properties.**
- **The EPRs also provide the ability (if required) to link with Council's Integrated Stormwater Solutions (such as the existing Edithvale System) and the proposed future system for Bonbeach and Bondi Road.**
- **The EPRs relating to surface water are considered satisfactory, and the IAC makes no recommendations for changes beyond the changes made by LXRA.**

10 Impacts on wetlands

10.1 Background

The Project areas are situated in the vicinity of the former Carrum Swamp, a large wetland extending from Mordialloc to Frankston (Figure 9). The railway line was constructed on the outer sandy barrier in the late nineteenth century and the swamp has been extensively drained. The Edithvale-Seaford Wetlands, Edithvale Common and Wannarkladdin Wetlands are remnants of the Carrum Swamp (Figure 10).

The EES has also identified other Groundwater Dependent Ecosystems (GDEs) near the Project areas, including the Aspendale to Carrum Foreshore Reserve, Chelsea Bicentennial Park, Beazley Reserve, Rosedale Golf Course, Patterson River Golf Course, residential areas (vegetation in nature strips and backyards) and an unnamed area south of Edithvale wetland that is currently being developed[89]. The Patterson River and Centre Main Drain also interact with groundwater[90]. This Chapter focuses on the potential impact of the projects on the wetlands. The Aspendale to Carrum Foreshore Reserve is discussed separately in Chapter **Error! Reference source not found.**1.

10.2 What are the risks?

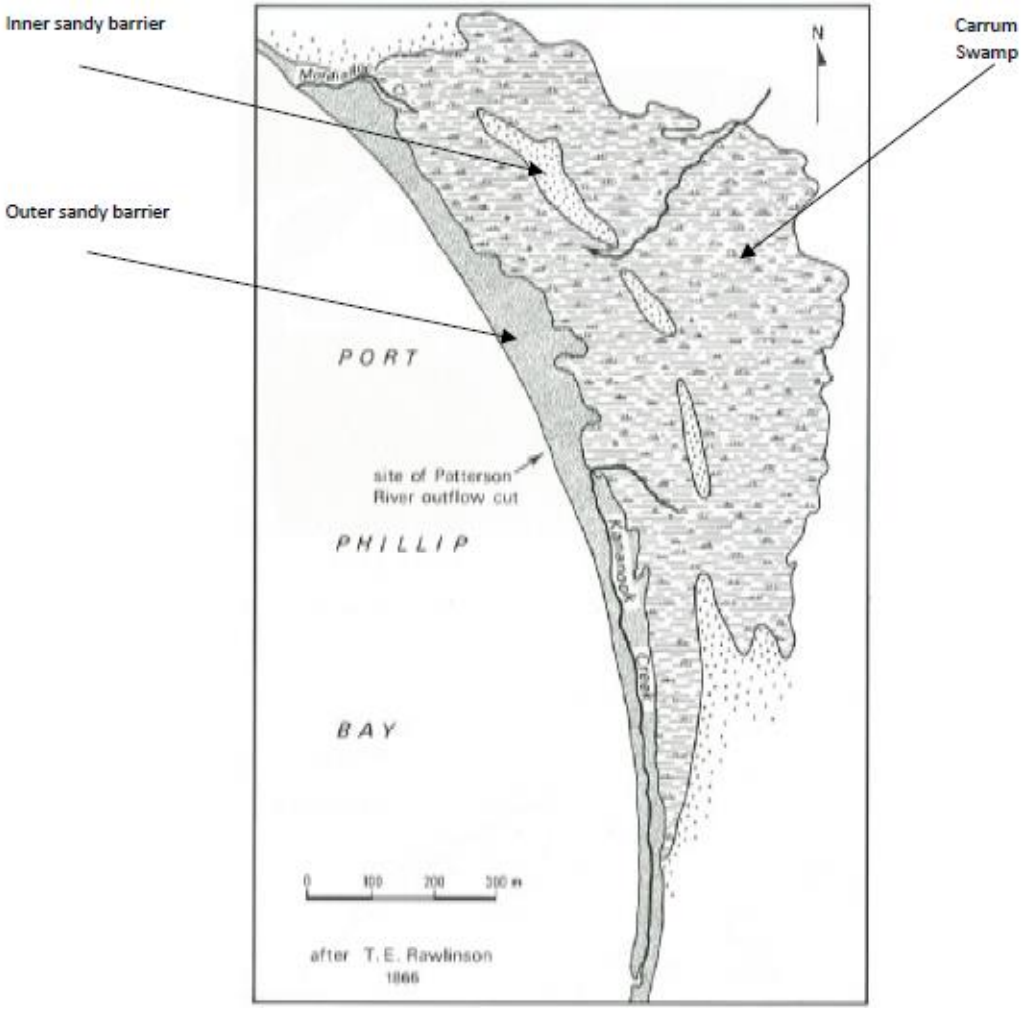
The potential impacts on the wetlands arising from the Projects are consequences resulting from groundwater mounding and/or water quality impacts, which have been discussed in previous chapters (Chapters 6, 8 and 9). Such impacts may arise solely due to the Projects, or due to the changes in groundwater levels or quality exacerbating or accelerating the effects of climate change and/or sea level rise. The key issues are:

- Loss or degradation of native vegetation in the Edithvale Wetlands, Edithvale Common and/or Wannarkladdin Wetlands, including threatened vegetation species and communities, potentially leading to a reduction in the extent of native vegetation in Victoria
- Loss or degradation of fauna habitat (including waterbird habitat) the Edithvale Wetlands and/or Wannarkladdin Wetlands
- Loss or degradation of wetland habitat at the Edithvale Wetlands and/or Wannarkladdin Wetlands, resulting in exacerbation of a threatening process listed under the FFG Act
- Loss of wet grassland / mudflat habitat that is significant for listed migratory and threatened bird species
- Impacts on listed migratory and threatened bird species, including the Australasian Bittern *Botaurus poiciloptilus,* Curlew Sandpiper *Calidris ferruginea*, Sharp-tailed Sandpiper *Calidris acuminata* and Latham's Snipe *Gallinago hardwickii*
- A change in the Ecological Character of the Edithvale-Seaford Wetlands Ramsar Site, potentially exceeding the Limits of Acceptable Change for Critical Components, Processes and Systems
- Failure of the Edithvale-Seaford Wetlands to continue to meet the criteria for listing as a Ramsar site.

89 Technical Report B, p38

90 Technical Report B, p38

Figure 9 Map of the former Carrum Swamp [91]



10.3 EES, Evidence and Submissions

Chapter 6 of the EES summarises the assessment of impacts on the wetlands undertaken by AECOM GHD. The full assessment is presented in EES Technical Report B). The Edithvale Wetlands section of the Edithvale-Seaford Wetlands Ramsar was an area of particular focus of the EES, and more detailed assessments were undertaken for this area than for other wetlands[92]. The Seaford Wetlands were not investigated in the EES because they were not expected to be affected by the Projects as they are more than 2 kilometres south of the southern extent of the Project Areas and are physically and hydrologically separated from the wetlands to the east of the project areas by the Patterson River[93].

91 From Bird 1993, reproduced in Technical Report M
92 Technical Report B, Page viii
93 Technical Report B, Page viii

Figure 10 Map of GDEs in the study area, including the wetlands[94]

The EES assessed existing ecological conditions based on:

- A desktop review of relevant databases and online tools as well as limited literature review
- Site inspections.

The likely presence of species listed as threatened or migratory under the EPBC Act and/or listed as threatened in Victoria was determined based on desktop assessment using VBA records, species ecology and habitat values observed during the site inspections.

94 Technical Report B, Figure 6

Potential impacts of the Projects were determined by inference from the nature and extent of impacts on regional groundwater determined from modelling (as discussed in Chapter **Error! Reference source not found.**). Field surveys of habitats at the Edithvale Wetlands were undertaken concurrently with the groundwater modelling to enable more detailed analysis of impacts of groundwater changes on wetland habitats to be undertaken if required. However, due to the limited magnitude of change in groundwater levels indicated by the modelling, the detailed analysis was not completed[95].

Independent peer review of Technical Report B was undertaken by Dr Matthew Dell of Ecology Australia, who concluded that "*the technical report provides adequate content to address the relevant scoping requirements*"[96].

Two expert witness reports addressing the impacts of the Projects on the wetlands presented at the Hearing:

- LXRA – Mr Cameron Miller
- Council – Mr Lance Lloyd.

Submissions regarding potential impacts of the projects on the wetlands were received from:

- Council
- Community groups, including Friends of Edithvale Seaford Wetlands Incorporated (FESWI), Port Phillip Conservation Council Inc, Kingston Residents Association and the Mordialloc Beaumaris Conservation League
- Private individuals[97].

10.4 Description of Edithvale Wetlands and Wannarkladdin Wetlands

10.4.1 Edithvale Wetlands

(i) Overview and History

The EES describes the Edithvale Wetlands as a complex of wetland cells with varying water quality, ranging from fresh to hypersaline, and different relationships to surface water and groundwater[98]. In simplest terms, the Edithvale Wetland can be divided into two parts, Edithvale North and South, and these main sections are, in turn, divided into wetland cells (Figure 11). The various wetland cells contain a mosaic of different habitat types that support different flora and are preferred by different bird species. The EES presented conceptual models illustrating relationships between the wetland cell ecosystems (including associations with key water birds) and groundwater. Copies of the conceptual models are reproduced in Figure 12 (Edithvale North) and Figure 13 (Edithvale South).

The EES indicates that the Edithvale Wetlands have been extensively modified and form part of a regional drainage system for stormwater[99]. Prior to 1987, the Edithvale wetlands consisted of shallow freshwater marsh and permanent open water. However, excavations in 1987-88 pierced the natural clay layer underlying the wetlands, allowing the influx of more

95 Technical Report B, page 121
96 Technical Report B, Appendix K p 5.
97 Submission Nos. 8, 25, 98
98 Technical Report B, p 44 onwards
99 Technical Report B p 44

saline groundwater which changed some of the wetland cells to brackish or saline[100]. The Edithvale Wetlands are managed for conservation, with interventions including pumping of water into the wetlands during dry periods and slashing of reed beds to maintain habitat diversity.

Figure 11 Map of Edithvale Wetlands[101]

100 Technical Report B, p 81

101 From EES Technical Report, Figure 9

Figure 12 Conceptual model of Edithvale Wetland north[102]

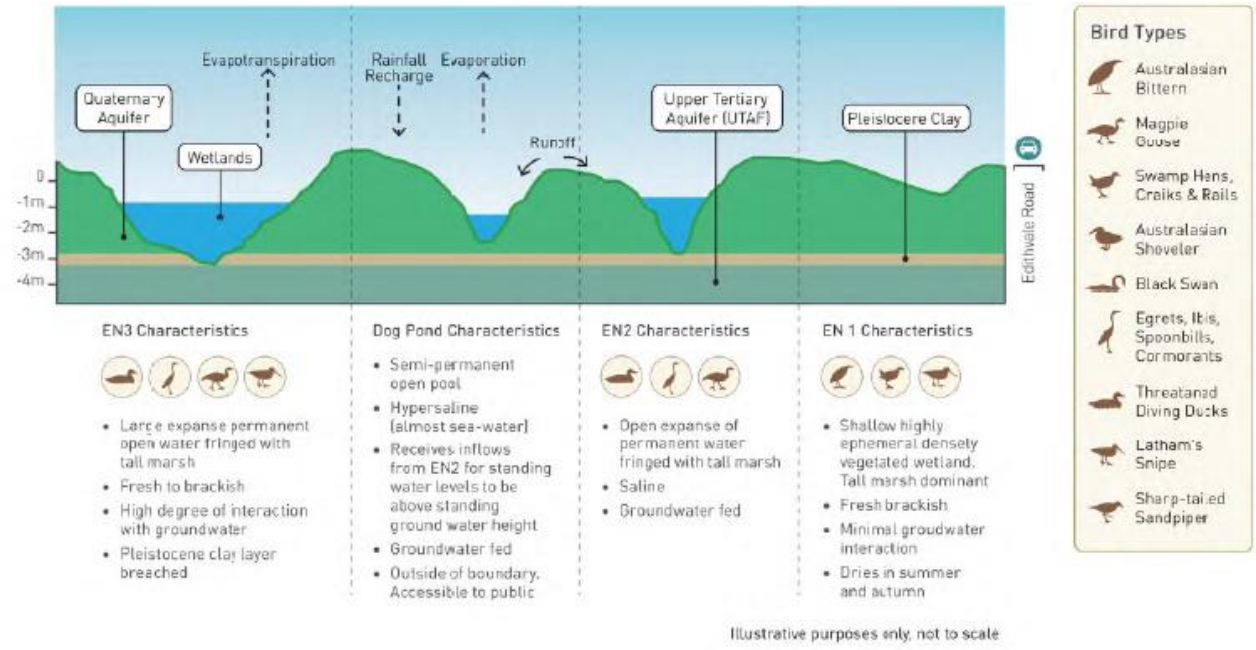
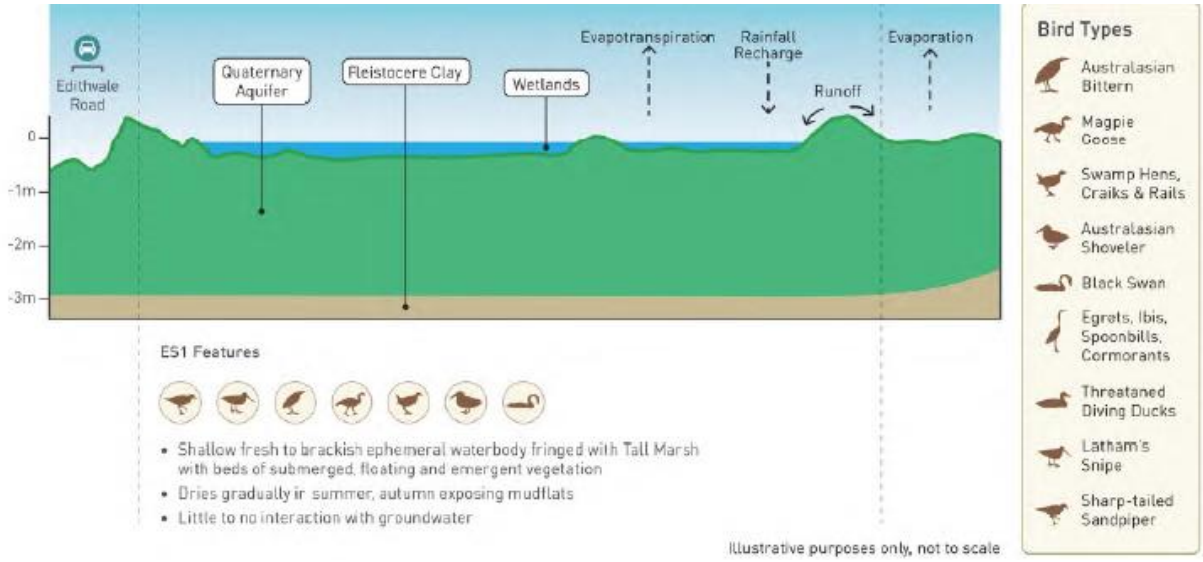


Figure 13 Conceptual model of Edithvale Wetland south[103]



(ii) Flora and Fauna

The EES reports that the Edithvale Wetlands support native vegetation representing eight Ecological Vegetation Classes (EVCs), which are listed below together with their bioregional conservation status in the Gippsland Plains Bioregion where applicable[104]:

- Damp Sands Herb-rich Woodland (EVC 3) – 'vulnerable'
- Swamp Scrub (EVC 53) – 'endangered';
- Brackish Aquatic Herbland (EVC 537) – not assigned a bioregional conservation status for the Gippsland Plain

102 EES Technical Report B, Figure 10
103 EES Technical Report B, Figure 11
104 Technical Report B, p 45; Hearing document 25. Ecology Australia – Site Management Plan 26 September 2016

- Brackish Herbland (EVC 538) – not assigned a bioregional conservation status for the Gippsland Plain
- Plains Sedgy Wetland (EVC 647) – not assigned a bioregional conservation status for the Gippsland Plain
- Aquatic Herbland (EVC 653) – not assigned a bioregional conservation status for the Gippsland Plain
- Brackish Wetland Aggregate (EVC 656) – 'endangered'
- Tall Marsh (EVC 821) – not assigned a bioregional conservation status for the Gippsland Plain.

The EES reported that "*no threatened flora species have been recorded within Edithvale Wetland*"[105]. However, it noted that the following species have a moderate likelihood of occurrence based on availability of suitable habitat:[106]

- River Swamp Wallaby-grass *Amphibromus fluitans* ('vulnerable' under the EPBC Act)
- Swamp Everlasting *Xerochyrsum palustre* ('vulnerable' under the EPBC Act, listed under the FFG Act and 'endangered' in Victoria)
- Pale Swamp Everlasting *Coronidium gunnianum ('*vulnerable' in Victoria)
- Lacey River Buttercup *Ranunculus amplus* ('rare' in Victoria).

The Edithvale Wetlands provide important habitat for many species of birds, including threatened and migratory species[107]. The EES reported that 183 bird species have been recorded at Edithvale Wetland[108]. Four key migratory bird species formed the basis for the Ramsar listing of the Edithvale-Seaford Wetlands Ramsar site: Curlew Sandpiper *Calidris ferrugin*, Sharp-tailed Sandpiper *Calidris acuminata*, Australasian Bittern *Botaurus poiciloptilus* and Latham's Snipe *Gallinago hardwickii*[109]. The Australasian Bittern ('endangered' under the EPBC Act) and Curlew Sandpiper ('critically endangered' under the EPBC Act) regularly occur at the Edithvale Wetlands[110]. Another 12 species of migratory shorebirds listed under the EPBC Act have also been recorded at the Edithvale Wetlands[111]. In addition, 15 threatened bird species have been recorded in the Edithvale Wetlands, the most prevalent being the Australasian Shoveler *Spatula rhynchotis,* Blue-billed Duck *Oxyura australis,* Hardhead *Aythya australis* and Musk Duck *Biziura lobate*[112]. The Edithvale Wetlands also provide regionally significant habitat for a range of common birds[113].

The EES indicates that 10 species of frogs have been recorded[114] in the Edithvale Wetlands. There are historical records of the Growling Grass Frog ('vulnerable' under the EPBC Act, 'listed' under the FFG Act and 'vulnerable' in Victoria) and the Southern Toadlet ('vulnerable' in Victoria)[115]. The Swamp Skink (listed under the FFG Act and 'vulnerable' in Victoria) is possibly present[116]. No targeted reptile surveys are known to have been undertaken, but 21

105 Technical Report B, p 65
106 Technical Report B, Appendix C
107 Technical Report B, p 72
108 Technical Report B, p 72
109 Technical Report B, p 75
110 EES B44-45
111 Technical Report B, p 78
112 Technical Report B, page 78
113 Technical Report B, page 72
114 Technical Report B, page 74
115 Technical Report B, page 80
116 Technical Report B, page 80

reptile species of reptiles have been identified as potentially present[117]. A total of 29 mammal species have been recorded in the Edithvale-Seaford Wetlands, including the Grey-headed Flying Fox *Pteropus poliocephalus*, which is listed as a threatened under Commonwealth and state legislation[118].

(iii) Significance

The Edithvale Wetlands are part of the Edithvale-Seaford Wetlands Ramsar Site, which was listed as a wetland of international importance under the Ramsar Convention in August 2001[119]. The Edithvale Wetland is owned by Melbourne Water[120], which manages the wetland in accordance with the "Edithvale-Seaford Wetlands Ramsar Site Management Plan"[121].

Mr Lloyd's expert witness report outlined the four Ramsar wetland types that occur within the Edithvale-Seaford Wetlands Ramsar Site:

- Ts - Seasonal / intermittent freshwater marshes/pools on inorganic soils
- Ss - Seasonal/intermittent saline/brackish/alkaline marshes/pools
- Xf - Freshwater, tree-dominated wetlands
- P - Seasonal/ intermittent freshwater lakes.

The EES reports that the high conservation significance of the Edithvale Wetlands is also recognised by the following:

- Listing as a wetland of national importance in the Directory of Important Wetlands in Australia
- Recognition as a site that is internationally important for shorebird conservation in the East Asian Australasian Flyway (EAAF)
- Inclusion in the Carrum Wetland Key Biodiversity Area program led by BirdLife Australia
- Identification as a site of State and International Treaty Zoological Significance in the south east of Melbourne and Mornington Peninsula by DSE in 2004
- Identification as a high value site of biodiversity significance by Melbourne Water
- Inclusion of an Environmental Significance Overlay in the Kingston Planning Scheme.

Edithvale Common is a recreation reserve adjacent to the Edithvale Wetlands that supports two wetland cells identified as part of the Edithvale Wetland but outside the Edithvale-Seaford Wetlands Ramsar site[122]. It is part of the Carrum Important Bird Area (IBA) (BirdLife Australia) and is covered by an Environmental Significance Overlay under the Kingston Planning Scheme[123].

Evidence from Mr Lance Lloyd (expert witness called by Council) confirmed the Edithvale Wetlands have significant ecological values despite "*being in an urban setting*" and "*altered and impacted by historical disturbance of water regime, water quality and vegetation*" (p 3).

117 Technical Report B, page 73
118 Technical Report B, page 73
119 EES, Page 6.9
120 Technical Report B page 44
121 Ecology Australia – Site Management Plan 26 September 2016. Hearing Document 25.
122 Technical Report B, p 121
123 Technical Report B, p 121

Friends of Edithvale Seaford Wetlands submitted that, in addition to the very high environmental values outline in the EES, the Edithvale Wetlands have regional significance as part of a wider wetland and habitat complex, including provision of drought refuge for protected bird species[124]. They submitted that:

> *The site is unique in its seasonal watering and food production (primary and secondary production) that supports such high numbers of visiting bird numbers[125].*

The EES noted that the Edithvale-Seaford Wetlands are highly valued by the community and are used for recreation and education purposes. The Edithvale-Seaford Wetland Education Centre is situated at Edithvale Wetland and is managed by Melbourne Water. There is also a bird hide at Edithvale that is used by members of the public and researchers.

The submissions to the EES review process received from community groups (Friends of Edithvale Seaford Wetlands, Port Phillip Conservation Council Inc, Kingston Residents Association and the Mordialloc Beaumaris Conservation League) and private individuals[126] reflect a high level of community interest in the Edithvale Wetlands.

10.4.2 Wannarkladdin Wetlands

(i) Overview and History

The Wannarkladdin Wetlands, like the Edithvale Wetlands were part of the former Carrum Swamp. Centre Main Drain runs through the middle of the Wannarkladdin Wetlands[127]. The EES reports that the Wannarkladdin Wetlands are ecologically similar to Edithvale Wetlands. Wetland habitats include reed beds, bare soil or mud, open shallow water, deeper pools (B105), and range from fresh to brackish to saline[128].

(ii) Flora and Fauna

The EES reported that recent vegetation showed that 3 EVCs are present at Wannarkladdin Wetland[129]:

- Tall Marsh (EVC 821)
- Brackish Wetland (EVC 656)
- Brackish Aquatic Herbland (EVC 537).

EVC 656 is 'endangered' in the Gippsland Plains bioregion, whereas EVCs 821 and 537 have not been assigned a bioregional conservation status for the Gippsland Plains bioregion[130].

The EES reported that the same threatened flora species that may occur in the Edithvale Wetlands also have a moderate likelihood of occurring in the Wannarkladdin Wetland[131]:

- River Swamp Wallaby-grass *Amphibromus fluitans* ('vulnerable' under the EPBC Act)

124 FESWI paras 19 and 23
125 FESWI para 24
126 Submission Nos. 8, 25, 98
127 Technical Report B, p 109
128 Technical Report B, p 109
129 Technical Report B, page 106
130 Ecology Australia – Site Management Plan 26 September 2016
131 Technical Report B, Appendix C

- Swamp Everlasting *Xerochyrsum palustre* ('vulnerable' under the EPBC Act, listed under the FFG Act and 'endangered' in Victoria)
- Pale Swamp Everlasting *Coronidium gunnianum ('*vulnerable' in Victoria)
- Lacey River Buttercup *Ranunculus amplus* ('rare' in Victoria).

The EES reported that 10 threatened and/or migratory bird species have been recorded by Birdlife Australia in the Wannarkladdin Wetlands (B108), including substantial numbers of Latham's Snipe *Gallinago hardwicki*[132]. Other recorded bird species of conservation significance include the Sharp-tailed Sandpiper, Caspian Tern *Hydroprogne caspia*, several species of egrets (Great Egret *Ardea alba*, Intermediate Egret *Ardea intermedia*, Little Egret *Egretta garzetta*) and several species of ducks (Australasian Shoveler *Spatula rhynchotis*, Blue-billed Duck *Oxyura australis*, Hardhead *Aythya australis* and Musk Duck *Biziura lobate*)[133].

(iii) Significance

The Wannarkladdin Wetlands are part of a complex of wetlands of national significance, which includes the Edithvale-Seaford Wetlands[134]. They have been identified as a site of biodiversity significance by Melbourne Water, 2013, are covered by an Environmental Significance Overlay under the Kingston Planning Scheme and are part of the Carrum Key Biodiversity Area program led by BirdLife Australia[135].

132 Technical Report B, page 108
133 Technical Report B, page 108
134 Technical Report B, page 105
135 Technical Report B, page 105

Figure 14 Map of Wannarkladdin Wetlands[136]

10.5 Sensitivity of the wetlands to changes

(i) Hydrology and water quality

The EES indicated that the hydrology of a wetlands (including frequency, timing and duration of inundation) has a critical influence its ecological character[137]. Changes in salinity can affect wetland flora and fauna through direct toxic effects, changed chemical processes and loss of habitat[138]. Flora and fauna species vary in their tolerance of saline and brackish

136 From Technical Report B, Figure 19
137 Technical Report B, page 94
138 Technical Report B, page 94

water[139]. Acid sulphate soils can affect wetlands through acidification of soils, groundwater and/or surface water and liberation of toxic metals such as cadmium and lead[140].

The EES noted that altered hydrology has the potential to alter[141]:

- the quality, extent and distribution of vegetation and habitat
- waterbird diversity and abundance
- waterbird breeding
- threatened species (including the Australasian Bittern and Curlew Sandpiper)
- wetland function (drainage and flood mitigation services).

These impacts are inter-related. For example, an increase in surface water level would reduce the extent of mudflat, which would reduce habitat for foraging shorebirds[142]. Food availability for shorebirds is also susceptible to water levels and salinity, which affect the diversity and abundance of benthic invertebrates[143].

The water level regimes in the Edithvale and Wannarkladdin Wetlands have been significantly modified from natural, as discussed above in the overviews of the wetlands. However, they retain important ecological values despite these modifications, as discussed above in relation to wetland significance.

The EES indicates that the Edithvale-Seaford Wetlands are listed under four Ramsar criteria[144]. It indicated that[145]:

> *Altered hydrological regime and/or water quality could lead to a change in the ecological character of the Edithvale-Seaford Wetlands Ramsar Site to the extent that the LAC for critical CPS are exceeded. Changed hydrology could also lead to failure of the site to meet criteria for listing under the Ramsar convention. If such a change were to occur this would be an internationally significant impact.*

Mr Lloyd (expert witness called by Council confirmed that:

- *…any threat to the water regime of the Wetlands, is likely to threaten the ecological character of the Edithvale-Seaford Wetlands Ramsar Site*[146]

Mr Lloyd advised that the water regime is that most important driver of the habitat mosaic of the Edithvale Wetlands, which in turn determines waterbird diversity and abundance, waterbird breeding, and the presence of threatened bird species[147].

Friends of Edithvale Seaford Wetlands noted that the ecology and hydrogeology (groundwater systems) of the wetlands are intimately connected[148]. However, they submitted that the EES underestimated the sensitivity of the ecology of the Edithvale wetlands to hydrological change[149].

139 Technical Report B, pages 96, 98
140 Technical Report B, page 98
141 Technical Report B, pages 94-95
142 Technical Report B, page 95
143 Technical Report B, page 97
144 Technical Report B, page 89-90
145 Technical Report B, page 104
146 Lloyd expert witness report, page 5
147 Lloyd expert witness report, page 5
148 FEWSI submission to Hearing, para 20
149 FEWSI, para 22

(ii) Other threats to the wetlands

The EES notes that there are also other threats to the Edithvale and Wannarkladdin wetlands, including[150]:

- Pollution
- Invasive exotic pest plant and animal species
- Invasive/out of balance native species, including Common Reed and Cumbungi
- Human disturbance, including recreational activities and rubbish dumping
- Fire management
- Climate change.

10.6 EES assessment of risks arising from the Projects

The EES determined that there were no risks to the wetlands during the construction phase of the Projects, given the significant distance between the construction areas and the wetlands[151].

The EES concluded that for the operational phase of the Projects, all of the risks that they considered were negligible. The assessment was based on the following specific risks[152]:

- A change in the ecological character of the Edithvale-Seaford Wetlands to the extent that the criteria for its listing as a Ramsar site are no longer met, resulting from changes in hydrological regime and/or water quality arising from groundwater mounding
- Failure of the Edithvale Wetland to regularly support listed migratory and threatened bird species, including Sharp-tailed Sandpaper, Latham's Snipe, Australian Bittern and Curlew Sandpiper., due to changes in habitat (wet grassland/mudflats) at Edithvale Wetland arising from hydrological changes due to groundwater mounding
- Loss of native vegetation within Edithvale Wetland resulting from changes in hydrological regime and/or water quality arising from groundwater mounding
- Habitat loss and a change in ecological character of Edithvale Wetland resulting in failure to meet the Limits of Acceptable Change for Critical Components, Processes and Services and/or Ramsar listing criteria, due to groundwater mounding resulting in acceleration or exacerbation of the predicted effects of sea level rise (climate change)
- Loss of native vegetation and/or fauna habitat associated with Wannarkladdin Wetland due to altered hydrological regime and/or water quality resulting from groundwater mounding
- Loss of Edithvale Wetland and/or Wannarkladdin Wetland
- Unintended spill of chemicals resulting in pollution of native vegetation or habitat (particularly Edithvale Wetland and/or Wannarkladdin Wetland) via surface flows and/or groundwater flows[153].

150 Technical Report B, page 94
151 EES page 6.11
152 EES p. 6.12 – 6.13 and 6.18
153 Technical Report D. Risk E49

These conclusions were based on the results of groundwater modelling undertaken for the EES, which predicted that there would be no change in groundwater levels in the wetlands resulting from the Project.

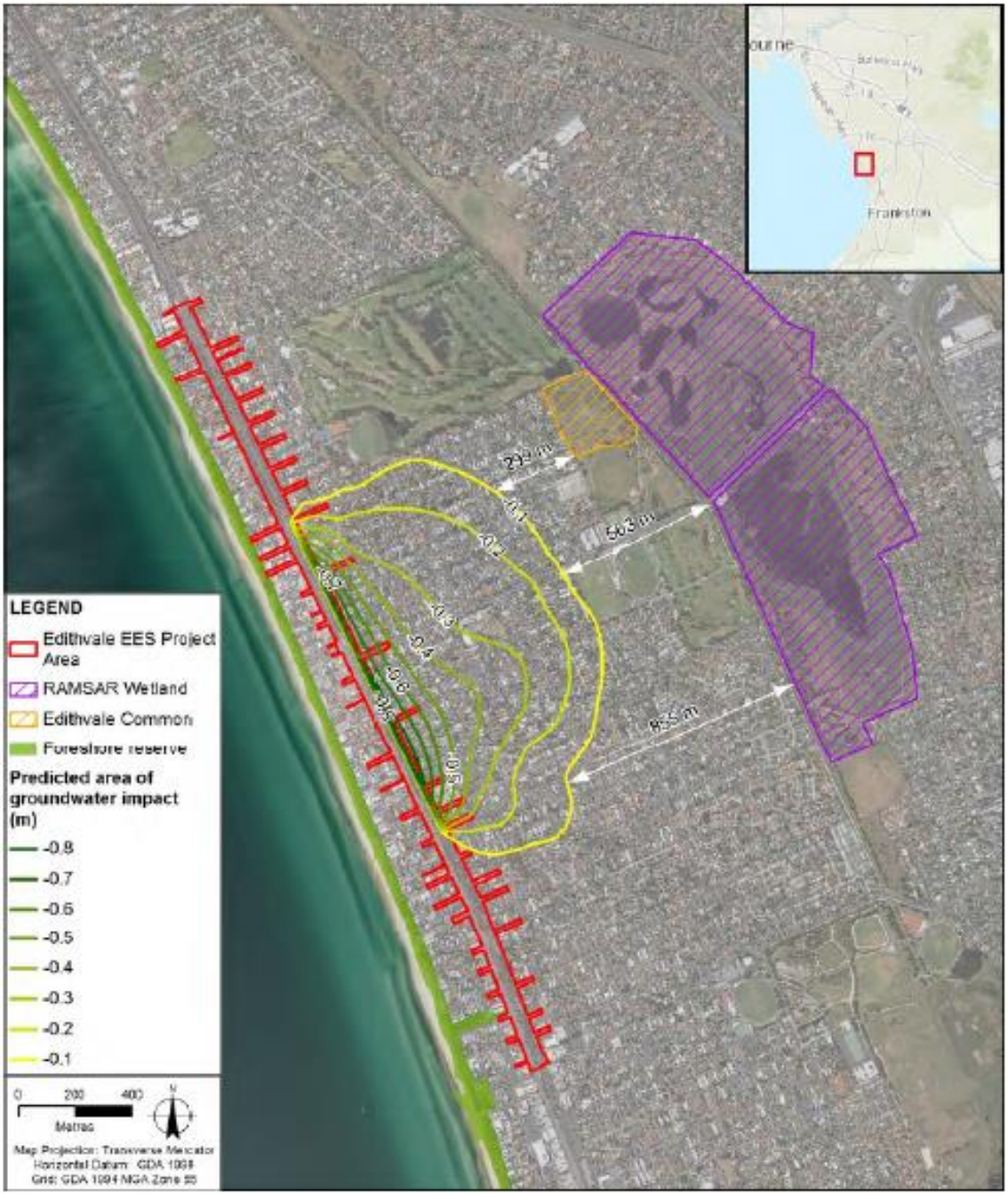
The groundwater modelling showed the rail trench would lead to groundwater mounding to the east of the Edithvale project area, but the area of impact was predicted to be at least 299 metres from the Edithvale Common and more than 500 metres from the Edithvale Wetlands (Figure 15). With mitigation measures (horizontal drain), the groundwater mounding would be at least 855 metres from the Edithvale Common and more than 1 kilometre from the Edithvale Wetlands (Figure 16). There groundwater mounding associated with the Bonbeach project is predicted to be over 1400 metres from the Wannarkladdin Wetland (Figure 17). Further discussion the groundwater modelling and results, including assumptions and limitations, is presented in Chapter 6.

Mr Lloyd reviewed the EES and agreed that if there is:

> *…no alteration to the groundwater regime, the closely connected surface water regime will show no effects and therefore there will be no impacts on the ecological character of the Wetlands*[154]*.*

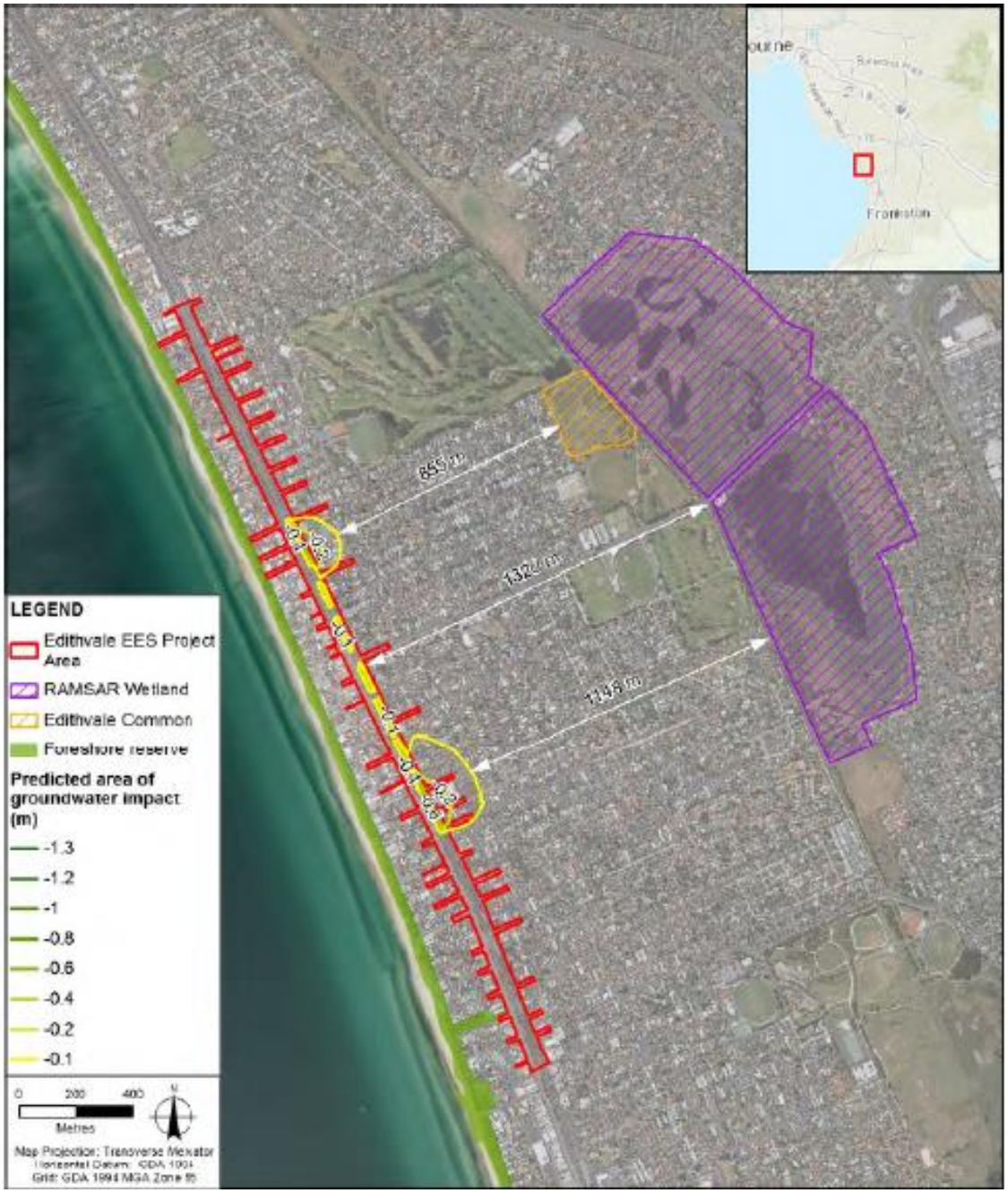
[154] Lloyd Expert Witness report, Page 7

Figure 15 Groundwater change post-trench installation at Edithvale (inland)[155]



155 Technical Report B, Figure 24

Figure 16 Groundwater change post-trench installation with groundwater management[156]



156 Technical Report B, Figure 25

Figure 17 Extent of groundwater change post-trench installation at Bonbeach (inland)[157]

Concerns about potential impacts of the Projects on the wetlands were raised in submissions by Community groups, including Friends of Edithvale Seaford Wetlands[158], Port Phillip Conservation Council Inc, Kingston Residents Association and the Mordialloc Beaumaris Conservation League, as well as private individuals[159].

Friends of Edithvale Seaford Wetlands raised several concerns regarding the impact assessment undertaken in the EES, including:

157 Technical Repot B, Figure 28
158 Submission No. 213, Hearing Document No. 26
159 Submission Nos. 8, 25, 98

- The scope of assessments
- Uncertainties regarding the groundwater modelling[160]
- Uncertainties regarding the long-term performance of mitigation works (horizontal drain)[161]
- Lack of redundancy in the mitigation works[162].

Friends of Edithvale Seaford Wetlands highlighted that the initial model showed that without the horizonal drain, a lot of water would be directed away from the coast and towards the Edithvale Wetlands[163].

Friends of Edithvale Seaford Wetlands submitted that:

> *Consideration of risk to the Edithvale Wetland, specifically its delicate ecohydrological balance, has not accounted for all* [relevant factors] *... For instance, considerations of risk have not included risks of interference with the fine scale seasonal water levels in the different cells and consequential risks to food and habitat values for protected bird species and/or Ramsar values, or they have not done so correctly or adequately*[164]
>
> *… There is still a high degree of uncertainty in the threats and impacts, which is associated with reliance on "conceptual' groundwater modelling and prediction combined with the complexity and sensitivity of the Edithvale Wetlands ecohydrology in particular.* [165]

10.7 Proposed monitoring and mitigation

The EES proposed that potential impacts of the Projects on the wetlands should be mitigated though the following EPRs:

- EPR GW1 – Rail trench design[166]
- EPR GW2 – Groundwater performance outcomes[167]
- EPR GW3 – Groundwater management plan[168]
- EPR FF8 – Groundwater-dependent ecosystem monitoring and mitigation plan (Edithvale Wetland)[169]
- EPR SW1 – Stormwater Management and Construction – in relation to spills during construction[170].

The EES proposed that the Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Edithvale Wetland) (EPR FF8) must be prepared prior to the handover of the constructed asset to the rail infrastructure asset manager (EPR GW3). However, the EES proposes that the plan would only be implemented if trigger levels for changes to

160 FESWI Submission, para 46
161 FESWI Submission, para 44
162 FESWI Submission, para 45
163 FESWI Submission, para 39, 40
164 FESWI Submission, para 42
165 FESWI Submission, para 49.
166 EES p 6.12-6.13, 6.18
167 EES p 6.12-6.13, 6.18
168 EES p 6.12-6.13, 6.18
169 EES p 6.12-6.13
170 EES Technical Report D p. 43

groundwater level and quality were identified by the groundwater monitoring program (EPR GW3, EPR FF8).

Mr Lance Lloyd (Expert Witness called by Council) advised that:

> *Ongoing monitoring of the groundwater and surface water levels, water quality and ecological character of the Wetlands is also necessary to ensure an early warning of any changes that do occur unexpectedly. This will ensure any impacts can be mitigated as soon as they are detected. Such a program is strongly recommended to mitigate against unforeseen impacts.*

Council proposed the following changes to EPR FF8 to address its concerns regarding potential impacts on the Edithvale Wetlands:

- Requiring the Edithvale Wetland Monitoring and Mitigation Plan to be prepared and funded prior to the completion of the Edithvale Project
- Requiring the Edithvale Wetland Monitoring and Mitigation Plan to identify the entity (or entities) responsible for monitoring and mitigation
- Specifying that Melbourne Water, the manager of the Edithvale-Seaford Wetlands Ramsar Site, be included in the list of parties to be consulted in the preparation of the Edithvale Wetland Monitoring and Mitigation Plan
- Specifying that the Edithvale Wetland Monitoring and Mitigation Plan is to be in two parts: monitoring and mitigation
- Making only the mitigation component of the plan conditional upon specific change criteria or trigger levels being met
- In respect of monitoring, commence with a data and monitoring gap analysis, then identifying further monitoring requirements
- Requiring that monitoring be undertaken for a period of at least 10 years, or longer if negative impacts on the Edithvale Wetland are identified.

Friends of Edithvale Seaford Wetlands submitted that a precautionary option for minimising risks to the Edithvale Wetland is to:

> *Abandon a project design that relies on the trench option*[171]*.*

Alternatively, they submitted that:

> *Another response is to strengthen EPRs in order to require measures capable of meeting the issues and questions noted above*[172]*.*

Friends of Edithvale Seaford Wetlands submitted a table of their recommended changes to LXRA's proposed EPRs. It also proposed changes to EPR FF8, which specifically addresses the wetlands, as well as to other EPRs to reduce the risk of changes to groundwater levels and water quality that would detrimentally affect the wetlands and the associated migratory and threatened bird species, including CL5, GW1, GW2, GW3, GW4, SW1 and SW2. The proposed changes to EPR FF8 are discussed here and the changes to other EPRs are discussed in the relevant chapters.

Friends of Edithvale Seaford Wetlands proposed the following changes to EPR FF8[173]:

171 FESWI, Document No. 26, paragraph 50
172 FESWI, Document No. 26, paragraph 51
173 FESWI, Document No. 26, pages 21-24

- The monitoring and mitigation plan should be extended to the Wannarkladdin Wetlands, which are an important part of the wetland complex of the former Carrum Swamp, even though they are not part of the Ramsar site[174]
- The period of monitoring should be for a minimum of 10 years because the response times for the groundwater system are unknown
- The groundwater monitoring component of FF8 should cover the whole local groundwater system between the Project areas and the wetlands, rather than being confined to areas within and around the wetlands as proposed in the EES
- The plan should include criteria for determining whether changes in groundwater levels or quality along the transects from the Project areas to the wetlands are attributable to the Projects
- Clear criteria relating to groundwater levels and quality should be established for determining triggers for response.

In a subsequent submission made in response to Document 49 (Environmental Performance Requirements LXRA Version 3, 15 June 2018), Friends of Edithvale Seaford Wetlands emphasised the importance of the monitoring for providing an early warning of any impacts at the wetlands. They submitted that:

> *What is needed is an early warning system from the monitoring network of bores that extend along the edge of the projects and then along 3 West to East Transects (2 for Edithvale and 1 for Bonbeach) between the projects and Centre Swamp Drain to indicate potential adverse changes early.*

At the end of the Hearing, LXRA submitted the following alternative version of EPR FF8:

> *Agree with the land manager of the Edithvale Wetlands to provide funding to the land manager of the Edithvale Wetlands to implement monitoring and/or mitigation that is consistent with the Ramsar Site Management Plan.*

10.8 Discussion and conclusions

All of the parties agreed that the Edithvale Wetlands have high conservation values. There is also general agreement that the Wetlands have a high degree of sensitivity to changes in hydrology and water quality including salinity.

The assessment of potential impacts on the Wetlands presented in the EES indicated that the risks associated with the specific risk pathways that they assessed were negligible. However, as noted by Friends of Edithvale Seaford Wetlands, the impact assessment presented in the EES was limited in scope. For example, the EES only assessed the risk of a change in ecological character to the extent that the Edithvale-Seaford Wetlands **no longer meet the criteria for listing as a Ramsar site** (bold for emphasis) rather than a change in ecological character per se.

The assessments of potential impacts are heavily reliant on the results of the groundwater modelling and the effectiveness of the proposed horizontal drain in mitigating the impacts of the Edithvale Project on groundwater mounding, as noted by Mr Lloyd and Friends of Edithvale Seaford Wetlands. As discussed in Chapter 6, there are uncertainties regarding the groundwater modelling outputs, which lead to uncertainties regarding impacts on the

[174] FESWI, Document No. 26, para 54

wetlands. Concerns were expressed regarding the long-term effectiveness of the mitigation works (horizontal drain) at Edithvale. If the mitigation measures fail, then the level of risk to the wetlands will be higher than in the residual risk scenario.

These uncertainties and risks mean that it is important for risk mitigation measures to be undertaken in relation to groundwater levels and quality as discussed in previous chapters, and for a Monitoring and Mitigation Plan to be developed and implemented as proposed in EPR FF8.

The EES proposed that the Edithvale Wetlands Monitoring and Mitigation Plan would only be implemented if triggered by changes in groundwater levels and quality identified by the groundwater monitoring. However, Mr Lloyd and Friends of Edithvale Seaford Wetlands both submitted that it is important that the monitoring program be designed and implemented to provide early warning of any potential adverse impacts on the wetlands. Council proposed that the monitoring component of the Edithvale Wetlands Monitoring and Mitigation Plan should commence at the outset and only the mitigation component of the plan should be conditional upon specific criteria or triggers being met. The IAC agrees with Council's proposal for the plan to commence at the outset and the desirability of incorporating early warning indicators in the plan as recommended by Mr Lloyd and Friends of Edithvale Seaford Wetlands. Furthermore, the IAC agrees with Friends of Edithvale Seaford Wetlands that the assessment of changes in groundwater levels to provide early warning should be based on transects extending from the Project area to the wetlands, rather than being confined to areas within and around the Wetlands as proposed in the EES.

The EES did not specify a minimum period for the Edithvale Wetlands Monitoring and Mitigation Plan. Council and Friends of Edithvale Seaford Wetlands both submitted that the period of monitoring should be at least 10 years or longer if negative impacts on the wetlands are identified. The IAC agrees with this recommendation.

Council and LXRA both submitted that the land manager, Melbourne Water, should have a role in the development of the Edithvale Wetlands Monitoring and Mitigation Plan. The IAC agrees with this recommendation. However, it does not support LXRA's alternative version of EPR FF8 which is to provide funding to the land manager of the Edithvale Wetlands to implement monitoring and/or mitigation that is consistent with the Ramsar Site Management Plan, without providing further direction or guidance.

Council proposed that the monitoring component of the plan should commence with a data and monitoring gap analysis, then identifying further monitoring requirements. The IAC agrees that this should be done to avoid unnecessary duplication and ensure coordination between the monitoring plan and other monitoring being undertaken in the wetlands.

Friends of Edithvale Seaford Wetlands submitted that the plan should include criteria for determining triggers for mitigation response. The IAC agrees that criteria and options for mitigation should be established in the plan, although there should be flexibility to respond to unexpected impacts.

Council submitted that the Edithvale Wetland Monitoring and Mitigation Plan should identify the entity (or entities) responsible for monitoring and mitigation. The IAC agrees with this recommendation.

10.9 Findings

The IAC makes the following findings in relation to the impacts on the Edithvale or Wannarkladdin Wetlands:

- **The IAC considers that the key findings of the EES in relation to the Edithvale or Wannarkladdin Wetlands are reasonable based on the available information but notes limitations to the risk pathways considered and uncertainties in relation to changes in groundwater regime and their implications.**
- **The hydrology of the wetlands has a critical influence on their ecological character. Changes in hydrology also have the potential to affect waterbirds, including migratory threatened species.**
- **Changes in salinity and water quality, including pH, can also significantly affect wetland flora and fauna through direct toxic effects, changed chemical processes and loss of habitat.**
- **The risks to the wetlands arising from the Projects are secondary impacts that would occur as a consequence of changes in groundwater levels and flows, groundwater quality or surface water quality.**
- **The groundwater modelling undertaken for the EES indicates that significant groundwater mounding caused by the Projects is unlikely to extend to the Edithvale or Wannarkladdin Wetlands, particularly after mitigation measures (passive sub-surface horizontal drain) are applied at Edithvale. Minor changes in baseflows and wetland water levels may occur, but these are not predicted to significantly alter wetland habitat extents.**
- **If the groundwater modelling is correct, then no changes in wetland ecology would occur as a result of changes in groundwater levels. However, as discussed in Chapter 6, there are uncertainties regarding the groundwater modelling, leading to uncertainty regarding likely impacts on wetland ecology.**
- **To address these uncertainties, it is recommended that the EPR FF8 Monitoring and Mitigation Plan be developed and implemented. The IAC preferred version of EPR FF8 is shown in Appendix E.**

11 Impacts on foreshore vegetation

11.1 Background

The foreshore vegetation in the vicinity of the Project areas is part of the Aspendale to Carrum Foreshore Reserve, which extends from Mordialloc Creek to Osprey Lane, Carrum.

The potential impacts on foreshore vegetation associated with the Projects are consequences arising from groundwater drawdown and/or water quality impacts due to the projects (as discussed in Chapters 6 and 8) rather than direct impacts. They may arise solely due to the Projects, or due to the effects of the Projects exacerbating or accelerating the impacts of climate change and/or sea level rise.

The key issues are:

- Loss of native vegetation along the coastal reserve, including Coast Banksia Woodland
- Implications arising from the loss of foreshore vegetation, including loss of fauna habitat, increased risk of foreshore erosion, and a further reduction in the extent of native vegetation in Victoria
- Habitat fragmentation, resulting in the exacerbation of a threatening process listed under the FFG Act.

Chapter 6 of the EES summarised the assessment of impacts on the foreshore vegetation undertaken by AECOM GHD and the full assessment was presented in EES Technical Report B.

The investigations undertaken by AECOM GHD for foreshore vegetation were undertaken using the following methods and sources.

Existing ecological conditions were assessed based on:

- A desktop review of relevant databases and online tools as well as limited literature review
- Field assessments including mapping of native foreshore vegetation.

The likely presence of species listed under the EPBC Act as threatened or migratory and/or listed as threatened in Victoria was determined based on desktop assessment using Victorian Biodiversity Atlas records, species ecology and habitat values observed during the field assessment.

The potential impacts of the Project were assessed based on the nature and extent of regional groundwater impact and in its implications for the foreshore vegetation.

Independent peer review of Technical Report B was undertaken by Dr Matthew Dell of Ecology Australia, who concluded that "the technical report provides adequate content to address the relevant scoping requirements"[175].

Two expert witness reports addressing the impacts of the Projects of the foreshore vegetation were submitted to the IAC and presented at the hearing:

- LXRA – Mr Cameron Miller
- Council – Dr Jeff Yugovic.

[175] Technical Report B, Appendix K p 5

Submissions relating to foreshore vegetation were received from Council and several other parties. The matters raised in the submissions are summarised in relevant sections of the Chapter.

11.2 Description of foreshore vegetation

The EES reported that native vegetation in the coastal reserve around Bonbeach is more extensive and intact than it is around Edithvale. There are also some minor remnants of native coastal vegetation, such as individual Coast Tea Trees, within adjacent private properties.

The EES stated that the foreshore vegetation consists of three EVCs:

- Coast Banksia Woodland (EVC 2) – one small patch was identified in the Bonbeach area, none was found in the Edithvale area
- Coastal Dune Scrub (EVC 160) – numerous patches were recorded in in the vicinity of the Edithvale and Bonbeach Project area
- Coastal Dune Grassland (EVC 879) - dominated by Hairy Spinifex *Spinifex sericeus*, with introduced marram Grass *Ammophila arenaria* also common[176].

The EES presents maps of the native vegetation of the foreshore reserve in the vicinity of Edithvale and Bonbeach, which are reproduced in **Error! Reference source not found.**18 and Figure 1919. The maps are inconsistent with the text of the EES in that they show Coastal Tussock Grassland (EVC 163) rather than Coastal Dune Grassland (EVC 879). Expert evidence from Dr Yugovic (called by the Council) indicates that the Coastal Tussock Grassland EVC does not occur in the City of Kingston. Mr Cameron confirmed that this was a mapping error and that the areas mapped as Coastal Tussock Grassland EVC 163 were in fact Coastal Dune Grassland EVC 879[177].

The bioregional status in the Gippsland Plains Bioregion of Coast Banksia Woodland (EVC) is 'vulnerable' whereas EVC 160 and EVC 879 are 'depleted'[178]. The EES states that the foreshore vegetation is unlikely to support threatened flora species[179].

The EES indicates that the foreshore vegetation provides habitat for a range of non-threatened fauna species and forms a wildlife corridor, particularly for birds[180].

The foreshore vegetation has significant local values. It is recognised as an environmental asset in Section 21.08 of the Kingston Planning Scheme and one Coastal Banksia is listed as a significant tree under Schedule 3 of the Environmental Significance Overlay of the Kingston Planning Scheme[181]. The Friends of Bonbeach Foreshore group works with Council to maintain and enhance the coastal reserve[182] and the quality of the foreshore vegetation has been improved by weed control and revegetation work[183]. It has also been submitted that

176 EES p. 6.19
177 Mr Cameron Miller, Hearing Document No. 13, page 26
178 https://www.environment.vic.gov.au/__data/assets/pdf_file/0012/50511/Bioregional-Conservation-Status-for-each-BioEVC.pdf)
179 EES p. 6.21
180 EES p. 6.19
181 EES p. 6.19
182 EES p. 6.19; Council's submission
183 EES p. 6.19

the foreshore vegetation buffers beachfront housing from the strong south and south-westerly winds blowing across Port Phillip Bay [184].

Figure 18 Native vegetation of the foreshore reserve - Edithvale[185]

184 Francis Williams, Submission No. 147

185 EES Technical Report B, Figure 21

Figure 19 Native vegetation of the foreshore reserve - Bonbeach[186]

11.3 Sensitivity to changes

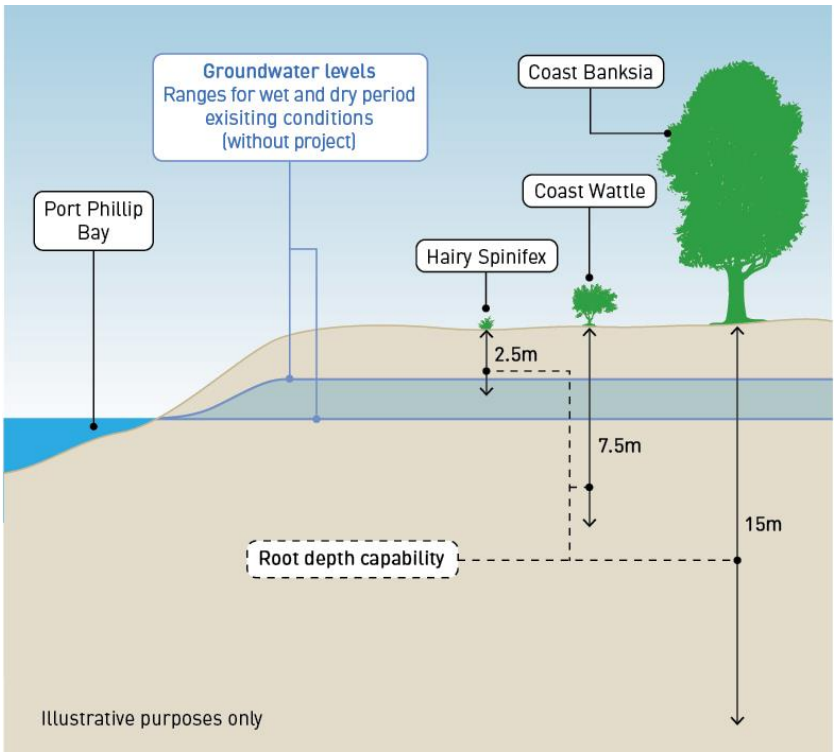
11.3.1 Groundwater levels

The EES has identified the foreshore vegetation as a groundwater-dependent ecosystem based on the following evidence[187]. Review of scientific literature indicates that the roots of coastal plants in sandy substrates can reach depths exceeding 10 metres and up to 15

186 EES Technical Report B, Figure 22
187 EES Technical Report B, p. 116-118

metres. Root to shoot ratios of up to 5:1 have been recorded for smaller coastal plants (up to 1.5 metres tall). Potential root depths for key foreshore vegetation species in the study area were estimated based on the above parameters to be as follows: Hairy Spinifex – 2.5 metres, Coast Wattle – 7.5 metres and Coastal Banksia – 15 metres. These depths overlap with the existing range of groundwater levels in the dunes (Figure 20).

Figure 20 Indicative root depth capability of foreshore vegetation relative to existing groundwater levels[188]



There is uncertainty regarding the sensitivity of the foreshore vegetation to changes in groundwater levels[189]. The foreshore vegetation is likely to receive a least some, if not most or all, of its water supply from rainfall. Dr Yugovic gave evidence that in relation to this question:

> *We appear to have reached a limit of knowledge of the ecology of dry coastal vegetation.*

The EES reported that if the foreshore vegetation is groundwater dependent, groundwater drawdown could lead to the loss of native vegetation along the coastal reserve as well as undocumented remnant vegetation and/or planted vegetation on residential properties between the railway corridor and the foreshore[190]. It noted that potential consequences of foreshore vegetation loss include:

- Loss of fauna habitat
- Fragmentation of the narrow habitat corridor of the foreshore reserve, resulting in the exacerbation of a threatening process listed under the FFG Act
- Increased risk of foreshore erosion

188 EES, Figure 6.11
189 EES p. 6.19, Dr Yugovic p7
190 EES Technical Report B p 143

- Net loss of native vegetation in Victoria[191].

11.3.2 Groundwater quality

The EES noted that groundwater drawdown could lead to increased seawater intrusion and/or activation of ASS[192]. Saline intrusion modelling predicted that groundwater drawdown associated with the Bonbeach Project would to lead to an increase in water table salinity in the order of 250–300 mg/L within 100 years (Chapter 8).

The EES noted the coastal setting of the foreshore vegetation and inferred that because of this, the foreshore vegetation would be likely to have "*a degree of tolerance to both salt laden winds and groundwater with increased salt concentrations*"[193].

However, in response to questions at the Hearing, Dr Yugovic advised that the existing foreshore vegetation requires at least some fresh water to survive and that environments associated with prolonged exposure of the root zone to saline water are associated with salt marsh vegetation communities.

The EES reported that the pH of the groundwater influences foreshore vegetation via effects on the solubility of aluminium. Soil acidification leads to increased solubility of aluminium, which in turn can retard plant root growth, restricting the uptake of water and nutrients[194].

11.3.3 Other Factors

The foreshore vegetation is also susceptible to a range of other factors, including:

- Weed ingress
- Trampling, disturbance and acts of public nuisance, e.g. lighting of fires
- Sea level rise[195].

11.4 Risks arising from the Projects

11.4.1 EES assessment

The EES concluded that risk of loss of native foreshore vegetation at Edithvale would be minor without proposed mitigation measures but the residual risk would be reduced to negligible with the proposed mitigation measures specified in the EPRs. It rated the risk of habitat fragmentation as negligible[196].

The EES concluded that risk of loss of native foreshore vegetation at Bonbeach would be minor without proposed mitigation measures, and the residual risk would remain as minor with the mitigation measures specified in the EPRs. The EES rated the risk of habitat fragmentation as negligible[197].

These assessments took into account the effects of groundwater drawdown on water availability as well as impacts via groundwater salinization or acidification.

191 EES Technical Report B, p. 143
192 EES Technical Report B, p. 143
193 EES Technical Report B, p. 143
194 EES Technical Report B, p. 143
195 EES Technical Report B, p. 116
196 EES Technical Report B, Appendix J.
197 EES Technical Report B, Appendix J

11.4.2 Effects of groundwater drawdown

The EES determined likely impacts of lowered groundwater levels on the foreshore vegetation by inferences based on the extent of drawdown indicated by the groundwater modelling (Figures 21, 22, 23) and the likely sensitivity of the foreshore vegetation. It noted that there are many uncertainties regarding the response of the foreshore vegetation to groundwater drawdown. The response may potentially be a change in plant health or floristic composition of the vegetation community rather than total loss of native vegetation[198]. Gradual drawdown may allow the vegetation to adapt where rapid drawdown could induce a stress response[199]. The response may be slow, potentially taking years or decades for changes in vegetation community composition or health to become apparent[200].

Dr Yugovic advised that "*it is difficult to predict the effect if any on vegetation due to a paucity of relevant published studies*"[201]. He also noted that the response of vegetation to groundwater drawdown is likely to vary between wet and dry years, with soil moisture replenishment by rainfall in a wet year likely to lessen stress on vegetation caused by groundwater drawdown and minimise any change.

198 EES Technical Report B, p. 144
199 EES Technical Report B, p. 144
200 EES Technical Report B, p. 144
201 Dr Yugovic p. 7

Figure 21 Extent of groundwater change post - trench installation at Edithvale (coastal)

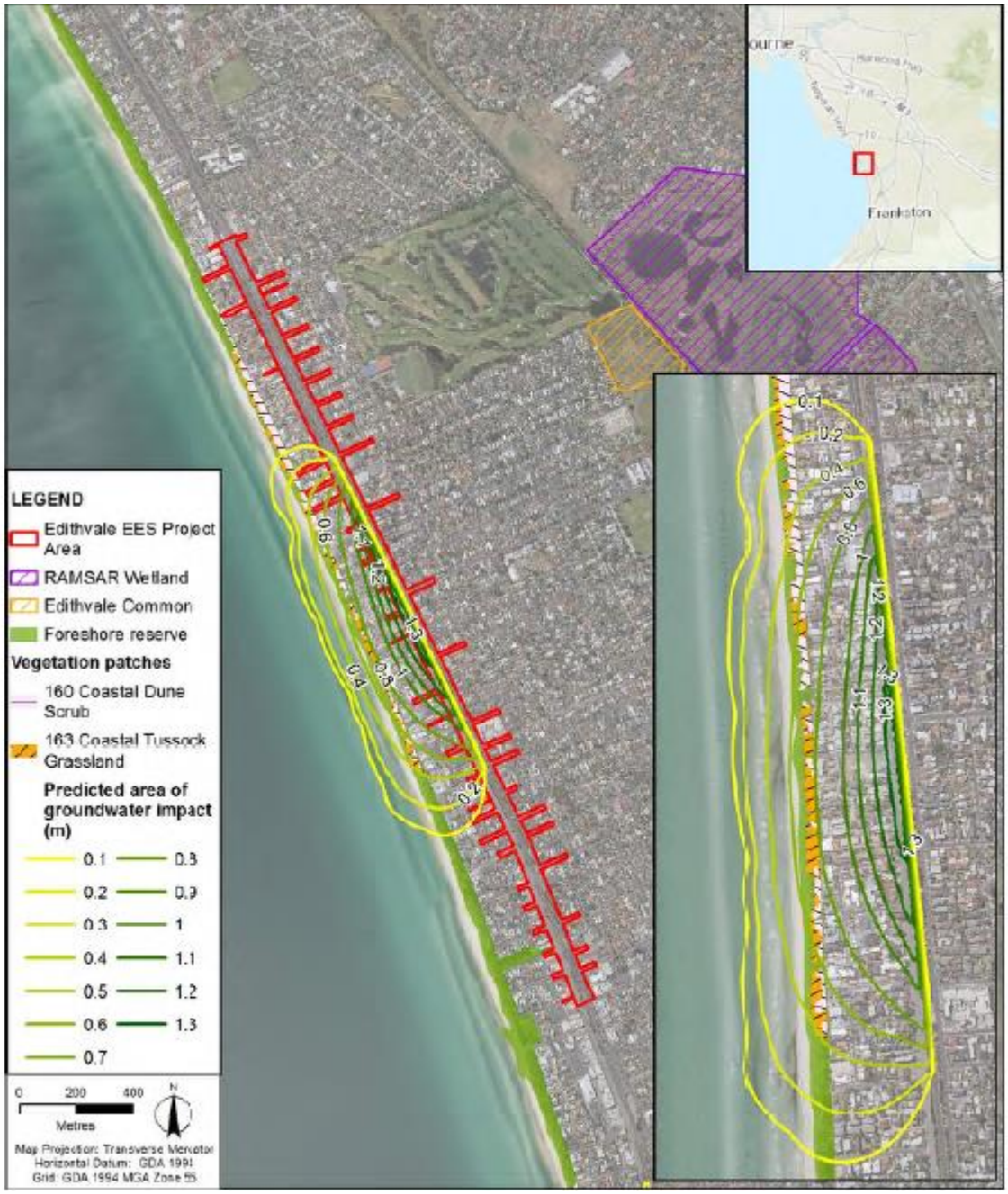


Figure 22 Extent of groundwater change post - trench installation with mitigation works at Edithvale (coastal)

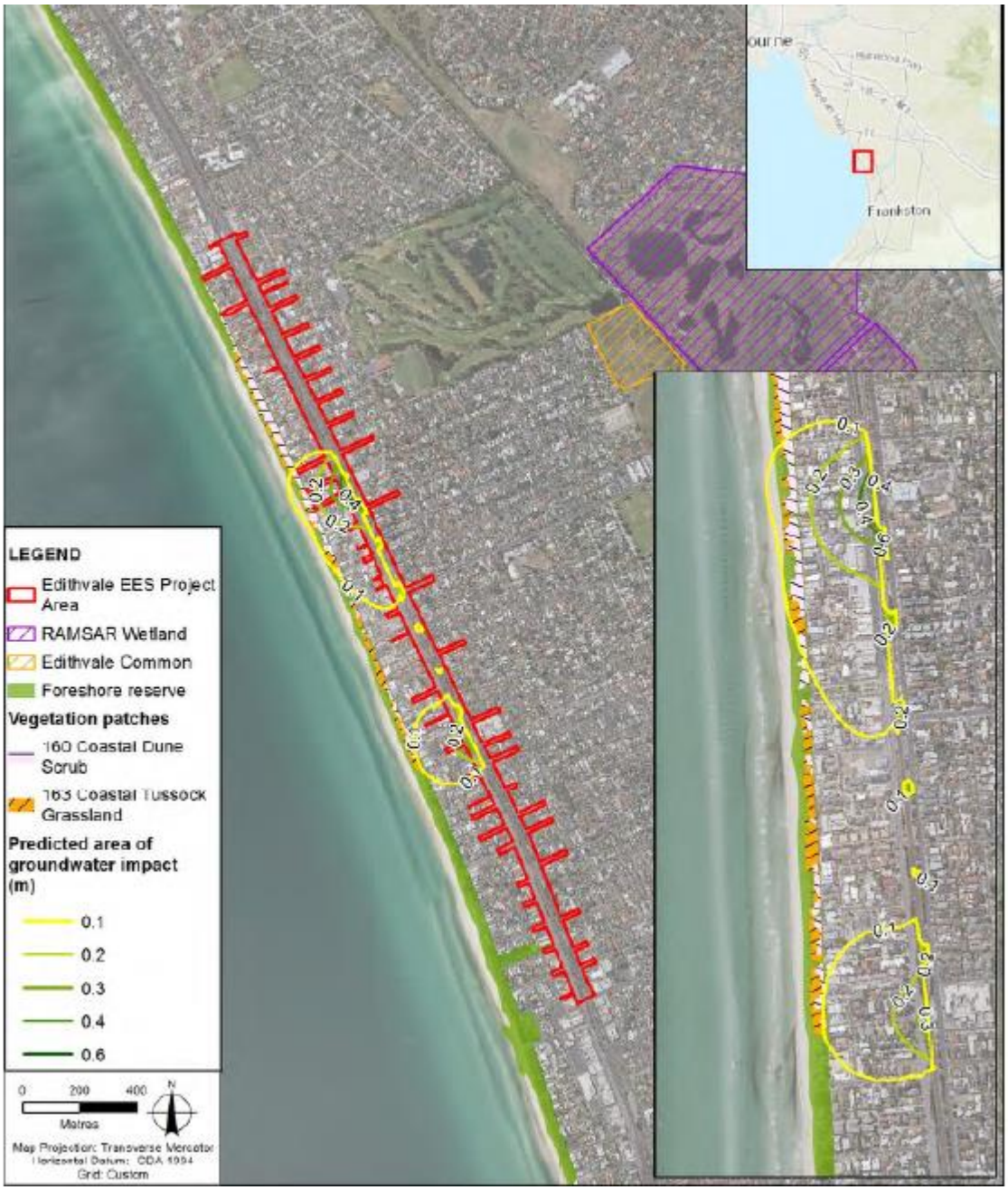
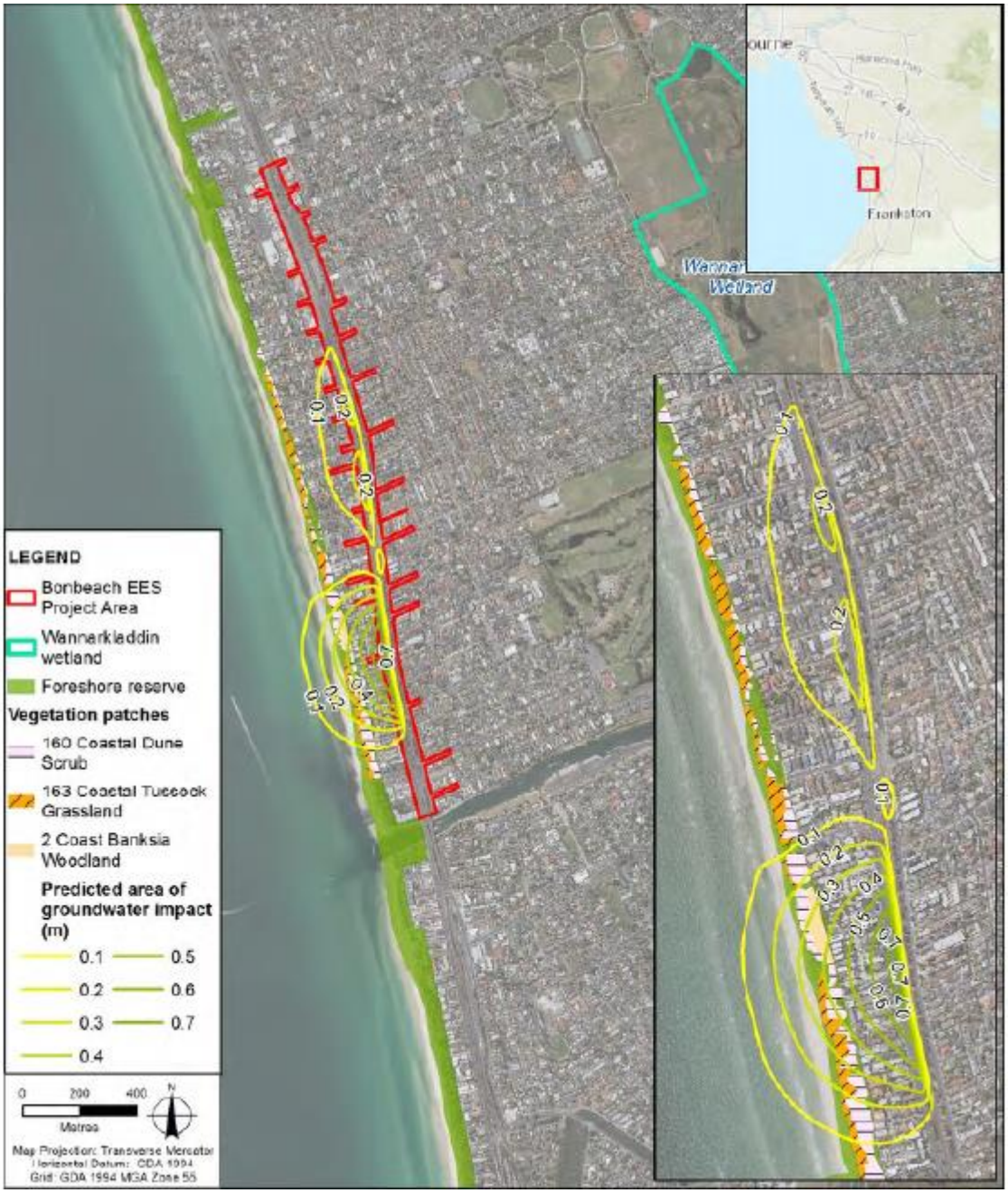


Figure 23 Extent of groundwater change post - trench installation at Bonbeach (coastal)



11.4.3 Impacts of changes in groundwater quality

The EES noted that an increase in groundwater salinity could affect the foreshore vegetation if it rises to a level that the plants cannot tolerate. Saltwater intrusion modelling showed that at both Edithvale and Bonbeach, the predicted changes in groundwater salinity are not expected to exceed that required for potable water under State Environment Protection Policy (SEPP) Groundwaters of Victoria 1997[202]. The model also indicated that ingress of the salt wedge in response to drawdown resulting from the rail trench would be slow, occurring over periods of years to decades[203].

202 EES Technical Report B, p. 143, 152

203 EES, p 5.48

The EES found that no potential ASS are expected to be activated at Edithvale (with proposed mitigation)[204] whereas at Bonbeach, a number of small areas of PASS could be activated as a result of the Bonbeach Project[205]. It concluded that the potential for soil and/or groundwater acidification to affect the health of the foreshore vegetation at Bonbeach could not be ruled out[206].

11.5 Proposed monitoring and mitigation

The EES proposed that potential impacts of the Projects on the foreshore should be addressed through the following EPRs:

- EPR GW1 – Rail trench design
- EPR GW2 – Groundwater performance outcomes
- EPR GW3 – Groundwater management plan
- EPR FF7 – GDE monitoring and mitigation plan for the foreshore vegetation (Edithvale and Bonbeach).

The submissions and evidence presented to the IAC in relation to foreshore vegetation focused on EPR FF7. Mr Cameron Miller of AECOM GHD JV provided expert evidence on behalf of LXRA. Council called expert evidence from Dr Yugovic, who confirmed that:

> *… it would be sensible and appropriate to monitor the foreshore vegetation, comparing it with control sites as the report suggests, with agency responsibilities clearly defined in this process[207].*

Council's initial submission made prior to the hearing sought greater clarity regarding the accountability and enforcement of monitoring obligations[208]. Council's submission noted three options:

- *A Government Agency effectively accepting that responsibility either now or at some near future stage*
- *Some form of agreement between that Government Agency and concerned parties (although that is not envisaged as likely or necessarily ideal)*
- *Inclusion of that responsibility through some form of enforceable control[209].*

Council submitted that, in addition to responsibility for the preparation of the plan being confirmed, the legal entity for approving the plan should also be identified[210].

LXRA proposed at the Hearing that the requirement for monitoring of foreshore vegetation should be removed and replaced with a requirement for a payment to be made to Council for enhancement of foreshore vegetation. Council, in its closing submission, agreed with this approach.

Council proposed that EPR FF7 be amended by deleting the text of EPR FF7 proposed in the EES and replacing it with the following:

204 EES Technical Report B, p 143
205 EES Technical Report B, p 152
206 EES Technical Report B, B p 152
207 Dr Yugovic p 7
208 Submission 226
209 Submission 226, p.2
210 Submission 226 p.2

> *Provide to Kingston City Council funding to be utilised to enhance foreshore native vegetation. The funding amount may be guided by an offset assessment and credit value pursuant to the DELWP Guidelines and/or by agreement including as to payment timing.*
>
> *Monitoring and potential mitigation in respect of groundwater as contemplated in EPR's GW3 and CL5*[211]*.*

LXRA proposed the following text for EPR FF7:

> *Prior to handover of the projects to the rail infrastructure asset manager, fund Kingston City Council to enhance foreshore native vegetation. Unless otherwise agreed between LXRA and Kingston City Council, the amount of the funding must be equivalent to the cost of acquiring native vegetation credits to offset:*
> - *a. 0.788 general habitat units with a minimum strategic biodiversity value score of 0.202 and 0.506 general habitat units with a minimum strategic biodiversity value score of 0.295; and*
> - *b. 6 Large old trees*[212]*.*

11.6 Discussion

11.6.1 Uncertainties Regarding Potential Impact of the Projects

It was generally agreed that there is uncertainty about the potential impacts of the Projects on the foreshore vegetation, particularly at Bonbeach, where a greater degree of groundwater drawdown is expected than at Edithvale (after mitigation).

There are several areas of uncertainty. The EES and the expert evidence presented to the IAC both indicate that the relationship between foreshore vegetation and groundwater is not well understood. There are also limitations to the modelling for the projects (as discussed in the Chapters on groundwater levels and quality), particularly the saline intrusion model which the EES indicated was at the limits of its resolution.

11.6.2 Funding for the Enhancement of Foreshore Vegetation

At Edithvale, the rail trench will incorporate works that have been predicted to reduce the residual risk to negligible.

Council and LXRA have both proposed that funding should be provided to the land manager (City of Kingston) to enhance the foreshore vegetation as a measure to mitigate environmental risks to the foreshore vegetation arising from the Bonbeach Project.

The IAC considers that this is an appropriate measure for reducing residual risk. At Bonbeach, no structural measures to mitigate changes in groundwater levels are proposed, and the residual risk will remain as "minor". It would be appropriate to implement measures to improve the resilience of the foreshore vegetation at Bonbeach to help it adjust to any impacts arising from changes in groundwater levels or quality, and to help manage the transition (e.g. address weed invasion risks which are often increased during ecological change).

211 Kingston City Council, Document No. 35

212 LXRA, Document No. 49

The IAC does not support formally quantifying the amount of money to be paid to the land manager in terms of an environmental offset. This may be construed as implying that full compensation has been provided for the potential future loss of the foreshore vegetation. An offset payment based on the standard formula is unlikely to fully cover the value of all of the services provided by the foreshore vegetation, such as protecting the dunes and beachfront properties from erosion. The IAC therefore prefers the more general wording proposed by Council that "*the funding amount may be guided by an offset assessment and credit value pursuant to the DELWP Guidelines and/or by agreement*".

11.6.3 Monitoring of Foreshore Vegetation

The Council and LXRA both proposed that if payment is made to the land manager for the enhancement of the foreshore vegetation, then the requirement for the monitoring and mitigation plan should be deleted. The IAC does not support this proposal.

Evidence presented at the Hearing by Dr Yugovic emphasised the importance of monitoring for ongoing management of the foreshore vegetation and to guide the response to any impacts arising from the Projects, for example, managing a transition from Banksia Woodland to Tea-Tree Woodland. He indicated that it would also provide wider benefits in terms of adding to the knowledge base regarding relationships between foreshore vegetation and groundwater.

The EES (EPR FF7) proposes that the monitoring of the foreshore vegetation should be integrated with the monitoring of groundwater quality and levels to isolate the effects of changes in groundwater levels and quality (salinity and acidity) from the effects of other pressures on the foreshore vegetation.

Dr Yugovic advised that the impacts of the Projects may be delayed, and may only become apparent during a critical period of foreshore vegetation stress. A long-term monitoring program (e.g. 10 years) is required to allow for this.

The EES proposes that the Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Edithvale and Bonbeach) (EPR FF7) must be prepared prior to the handover of the constructed asset to the rail infrastructure asset manager (EPR GW3). However, the plan would only be implemented if trigger levels for changes to groundwater level and quality were identified by the groundwater monitoring program (EPR GW3, EPR FF8). Dr Yugovic indicated that the monitoring of foreshore vegetation should commence at the outset and not be delayed until a significant change in groundwater become evident.

Submissions indicate that there is considerable community interest in the foreshore vegetation. Interested community groups include the Port Phillip Conservation Council (Submission 235), Kingston Residents Association (Submission 242) and Friends of Bonbeach Foreshore. Submissions regarding the Edithvale wetland requested that monitoring plan and results be made public (see Chapter 10). The IAC considers it appropriate that Foreshore Vegetation Monitoring and Mitigation Plan and monitoring results be made available to the public.

11.7 Findings

The IAC makes the following findings in relation to impacts on foreshore vegetation:

- **The Foreshore Vegetation Groundwater Dependent Ecosystem Monitoring and Mitigation Plan should be in two parts, monitoring and mitigation. Both plans**

should be prepared at the outset and should be publicly available. The entity/ies responsible for the preparation, approval and implementation of the plan should be identified.

- **The Monitoring part of the FF7 plan should commence at the same time as the groundwater monitoring under GW3 and CL5. The vegetation monitoring should be closely integrated with the groundwater monitoring (levels and quality). The duration of the monitoring program should be at least ten years. The results of the monitoring should be published at least annually.**
- **The Mitigation part of the FF7 plan would commence if pre-defined trigger levels set in the FF7 Monitoring Plan are met.**
- **The IAC proposes a new EPR FF9, which makes provision for funding to be provided to the land manager (City of Kingston) for works to enhance the resilience of the native foreshore vegetation at Bonbeach.**
- **The IAC's preferred versions of EPRs FF7 and FF9 are shown in Appendix E.**

12 Other social and environmental impacts

12.1 The issues

A range of other social and environmental impacts were addressed in the EES and were the subject of submissions. Issues included:

- Traffic
- Parking
- Noise
- Visual impact
- Historic and Aboriginal cultural heritage
- Vegetation removal.

12.2 Traffic

(i) The issues

Chapter 2.3.1 of the EES (Vol 1), details issues related to traffic benefits from the Projects. Technical Report G in the EES (Vol 2) covers traffic.

Issues are:

- Level crossing removal will remove safety risks to trains, vehicular traffic, cyclists and pedestrians
- New stations will improve commuter safety and access, via the provision of more space, improved visibility and accessibility
- The Projects will reduce traffic congestion in the general area
- The Projects will facilitate increased future rail patronage growth on the Frankston Line.

(ii) What are the risks?

Key risks that were assessed by the EES for the operational phase of the Projects included:

- The replaced road network and its arranged signalling, may not adequately cater for safe and efficient traffic movement, causing an unacceptable intersection safety performance
- Connectivity around the stations for pedestrians and cyclists being negatively impacted from level crossing removal.

(iii) EES response

The Edithvale and Bonbeach level crossings have significantly contributed to Frankston Line safety issues across the ten years to 2015. Edithvale has experienced one fatality, one vehicle and train collision and seven pedestrian 'near-misses' with trains. Bonbeach has experienced one vehicle and train collision, a total of 11 'near-misses' between vehicles and trains and one pedestrian near-miss with a train. Removal of these level crossings would remove these safety risks.

New rail stations with improved urban design, would improve safety and access for the community in the general areas surrounding the stations, via the provision of more space, improved visibility and pedestrian, cyclist and disabled person accessibility.

The EES discusses how the Projects would reduce congestion, through significant reduction in incidents, across faults with vehicle boom gates, warning bells and pedestrian gates at these existing crossings.

- Edithvale Road is a key arterial road, where during weekdays, up to 14,000 vehicles use the Edithvale level crossing. The vehicle boom gates are down at this crossing for an average of 42 minutes across the weekday morning peak period 7:00am to 9:00am
- The Station Street and Bondi Road level crossing is used by 4,500 vehicles per weekday, where these boom gates are down for an average of 45 minutes during the weekday morning peak
- In relation to assisting with predicted increased train patronage for the Frankston Line, the EES indicates PTV has forecast a 42 per cent growth in patronage across the two-hour morning peak between 2015 and 2031. Level crossing removal on the Frankston Line will assist in facilitating an increased number of train services.

To protect passing traffic from the rail trench, a 0.8 metre to 1.8 metre high concrete vehicle crash barrier is required running around the top of the trench. This will be accompanied with a screen on top of the crash barriers (forming a total barrier height of 2.4 metres), to prevent items being thrown onto the rail line. The Projects will be designed in accordance with the LXRA Urban Design Guidelines across station buildings, barriers and screens, car parking, pedestrian access, electrical sub-stations and landscaping.

Following the construction of the new deck for the Edithvale Project:

- Edithvale Road would be reinstated, and some modification of layouts and signalling for the Station Street and Nepean Highway intersections may be necessary, to correctly balance competing needs of vehicle traffic, public transport, cyclists and pedestrians. This detailed design is to be done using further traffic analysis, in consultation with Council and VicRoads
- Bus stops on Station Street and Edithvale Road will be generally retained (with some minor relocation of stops to match intersection changes). Bus routes 706, 858 and 902 currently travel along Station Street, but these do not use the existing level crossing. Bus routes 858 and 902 also use Edithvale Road
- A shared user pathway (both pedestrian and cyclists) will be provided alongside the rail trench on Station Street (west side) to match in with the new station area. This pathway corridor will hold new underground services for the stations
- The new station building would incorporate a bicycle storage facility
- Two *Disability Discrimination Act 1992* compliant pedestrian bridges will be provided over the rail trench, where a third such crossing is to also be incorporated at grade within the stations' vehicle parking deck. Final locations for these pedestrian crossings will be confirmed with both Council consultation and in recognition of community feed-back from the EES.

Following the construction of the new deck for the Bonbeach Project, to be located on the north side of the intersection of Station Street and Bondi Road:

- Station Street and Bondi Road will be relocated to their existing position on the new road bridge, where some modification of layouts and signalling for the Station Street/Bondi Road and Nepean Highway intersections may be expected, to correctly balance the needs of vehicle traffic, public transport, cyclists and pedestrians. This

detailed design is to be done with traffic analysis, in consultation with Council and VicRoads
- Future provision for bus stops to be added along Station Street will be considered
- A shared user pathway (both pedestrian and cyclists) will be provided alongside the rail trench on Station Street to match in with the new station area. This pathway corridor will hold new underground services for the stations
- The new on-deck station building would incorporate a bicycle storage facility
- Two *Disability Discrimination Act 1992* compliant pedestrian bridges will be provided over the rail trench. Final locations for these bridges will be confirmed with both Council consultation and in recognition of community feed-back from the EES.

(iv) Evidence and submissions

Ms Tamlyn Dwyer (Submission 178) did not support replacement of the Berry Avenue pedestrian crossing with an over-bridge (Edithvale Project). She requested either an at-grade, or underpass pedestrian crossing at this location, so locals could have continued easy access to the beach. Her main concern was the visual impact of a pedestrian bridge.

Chelsea Bonbeach Train Station Group (Submissions 6 and 183) submitted that the current rail pedestrian crossing points allow access from local streets, such as Golden Avenue and Broadway (where these are associated with substantial populations of seniors and medium density housing). They requested studies across traffic, bicycle and pedestrian movements be conducted for all of Station Street between Mordialloc and Carrum, with a focus on east-west access requirements. The group also indicated that where pedestrian over-bridges and access-ways with long and low-gradient ramps are provided, that more-direct stair access also be provided. The group requested that access still be provided for Golden Avenue and Broadway (in relation to the Bonbeach Project).

Mr Steven Hunt of Ratio Consultants, provided traffic evidence on behalf of LXRA. Mr Hunt conducted independent peer review across Technical Report G, and responded to EES submissions. In commenting across traffic modelling for operations, Mr Hunt gave evidence that:
- For Edithvale, traffic movements across the rail corridor would almost double, where some increases in Edithvale Road traffic were predicted
- For Bonbeach, the removal of the Bondi Road level crossing was not expected to result in an increased usage of the crossing. Increased traffic volumes using Station Street south of Bondi Road are expected, due to the new Station Street bridge crossing over the Patterson River. Modelling undertaken to-date suggested this impact can be accommodated by the Project
- Operations modelling for both Projects indicated that with modified signal timing and phasing, the redistributed traffic and increased traffic volumes can be accommodated
- Proposed EPRs T1 to T8 would prove an appropriate framework to manage and mitigated operational traffic for the Projects
- With the design and location of replacement pedestrian crossings, further appraisal of requirements should be considered into detailed design, to respond to submissions (improved pedestrian modelling, reducing pedestrian ramp lengths, including stair access to reduce walking distances)

- Further design consideration needs to be made across public transport connections to Edithvale Station (bus stops in Station Street, stair access to both pedestrian and bus connections).

LXRA provided a witness statement from Dr Pallavi Mandke of GHDP, who acted as the Technical Lead for the EES social impact assessment. Mr Mandke gave the following responses to EES submissions:

- In relation to Submission 178, the feasibility of a pedestrian underpass will be considered as a part of the design process, with guidance from EPR T3 and EPR UD1
- In relation to Submission 183, consideration of cross-connectivity would be retained through the provision of two *Disability Discrimination Act 1992* compliant pedestrian bridges over the rail trench, with a third such crossing incorporated at grade into the car parking deck. Final locations of these bridge crossings would be confirmed in consultation with Council and would consider community feedback.

Mr Noel Matthews (AECOM GHD JV), provided evidence in relation to land use and planning. In relation to operational traffic issues (connectivity), Mr Matthews offered that the EPRs were comprehensive and relevant for the Projects.

Mr Kevin Begg (AECOM GHD JV), provided evidence across urban design. Mr Begg currently has a place on LXRA's Urban Design Advisory Panel and provided advice across aspects of pedestrian crossings and bicycle end-of-trip facilities. He gave evidence that:

- The aspect of pedestrian crossings was raised by submissions from Ms Rosemary Genovese (Submission 6), Chelsea Bonbeach Train Station Group, Ms Elizabeth Joy (Submission 187) and Ms Susan Heggie (Submission 231). The general theme was to retain existing pedestrian crossings across the rail corridor and to provide additional pedestrian crossings across Nepean Highway. Mr Begg indicated that enhancing cross-corridor connectivity was a key objective for the Projects. He also pointed out the design constraints called under the Urban Design Framework, look to ensure both safety of pedestrian crossings and universally inclusive crossings
- The aspect of bicycle end-of-trip facilities for the new stations was raised by Ms Kirralee Ashworth-Collett (Submission 10) who requested a 'parkiteer' facility for the Edithvale Project. Mr Begg indicated that bicycle parking and cycling paths are to be provided for both Projects. Bicycle parking requirements are to be guided by the Projects Urban Design Guidelines.

The IAC raised questions in relation to the removal of on-road bicycle lanes, and whether this was consistent with State bicycle policy. LXRA advised that "*VicRoads currently designates the Principle Bicycle Network and a Strategic Cycling Corridor for both Bonbeach ('on-road' on the Nepean Highway) and for Edithvale ('on-road' on Station Street)*". They submitted that Bicycle Network and VicRoads had been consulted on the proposal to remove on-road bicycle lanes and replace them with an off-road shared path, and both agencies had provided support.

LXRA also referred to the VicRoads Traffic Engineering Manual, Volume 3, which prioritises the provision of an off-road facility (including a shared path) if possible.

The IAC questioned Mr Hunt on the proposed approach. He acknowledged that it is not ideal, but that it is an appropriate response given the restricted cross section that would remain. He also commented that the current sub-standard (narrow) on-road bicycle lanes are also not ideal.

(v) Discussion

Removal of the level crossings for Edithvale and Bonbeach will provide far safer east – west access across the rail line for all modes of transport (importantly pedestrians). Traffic disruption currently experienced in the wider area, to the two stations from traffic congestion, due to lowered rail boom gates in peak traffic periods will be notably reduced.

The Projects are still at concept design stage, where into detailed design, the State-appointed contractors for each Project and LXRA will have continued consultation with key stakeholders: Council, VicRoads and the community, to improve design outcomes.

The IAC notes that LXRA must work to specific design objectives, in relation to pedestrian level crossings with the rail line, where grade separation is recognised as the most effective option to minimise risk to safety. Compliance with the maintenance of station access in accordance with the *Disability Discrimination Act* is also required. Designs will be further optimised in accordance with LXRA's Urban Design Guidelines, to maintain and enhance pedestrian and cycling connectivity across the rail line. The IAC believes that LXRA should continue to consider rail underpasses as an option for the pedestrian crossings where they are feasible. There may be locations where they would be preferable.

The IAC has concerns about the impact of removing the on-road bicycle paths on Station Street. The IAC is not convinced that the proposed Project approach, which will result in disconnected off-road paths along Station Street is a good outcome. Cyclists will be forced to alternately go on and off road along the length of Station Street, with the result that road cyclists that currently distribute between Nepean Highway and Station Street will likely all move to the more heavily trafficked Nepean Highway.

In the IAC's view there is little likelihood that an off-road shared path will be constructed for the entire length of Station Street as this would require the removal of extensive track side vegetation and may further restrict parking. The proposed approach does not appear to be practical nor strategically well founded, and in the IAC's view requires more careful consideration. It may be appropriate, for example, to consider upgrading on-road bicycle facilities on Nepean Highway if on-road facilities are to be removed from Station Street, as part of an overall, more strategic response.

EPR T3 requires that the design be optimised "*to maintain and enhance pedestrian and cyclists connectivity in consultation with relevant road authorities, Kingston City Council and Public Transport Victoria where appropriate*". This wording should be sufficient to ensure that the issues are properly considered in the design development stage.

(vi) Findings

The IAC makes the following findings in relation to impacts on traffic:

- **The proposed EPRs relating to transport adequately address risks associated with traffic issues, including pedestrian and cycling facilities.**
- **With the implementation of the Environmental Management Framework and related EPRs, the Projects should not result in any significant detrimental long-term impacts to traffic for the Project Areas and surrounds.**
- **Prior to the finalisation of designs for bicycle access along Station Street and Nepean Highway, further consideration should be given to the broader on-road and off-road bicycle networks. A broader range of options should be developed in**

conjunction with Council, VicRoads and Bicycle Network that provides a more strategic response to the needs of both on-road and off-road cyclists along the corridor.

12.3 Parking

(i) The issues

Parking is covered within Chapter 2.3.1 of the EES (Vol 1) and Technical Report G of the EES (Vol 2). Key issues include:

- Community desire for increased vehicle parking for station commuters and local shopping centre patrons
- Improved accessibility for disabled persons
- Demand for 'kiss and ride' parking drop-off areas for improved safety.

(ii) What are the risks?

Key risks identified include:

- Changes to landscaping could result in parking space decreases
- Increased rail patronage will increase the demand for commuter vehicle parking
- Insufficient spaces provided for disabled persons parking.

(iii) EES documentation

For the Edithvale Project, no net-loss of car spaces for commuter use, relative to the existing station situation is proposed. Other informal commuter car parking and short-term parking may be provided along Station Street and Nepean Highway. Provided station parking will include 34 commuter car parks, one space for disabled person use, two spaces for station staff and one vehicle space for emergency vehicles. These spaces will be provided on the new deck structure, to the south of Edithvale Road, to be accessed via Station Street. Disabled person access compliant under the *Disability Discrimination Act 1992* is to be provided to the new station island train platforms via a lift located just north of Edithvale Road.

For the Bonbeach Project, no net-loss of car spaces for commuter use, relative to the existing station situation is proposed. Provided parking at the station will include 35 commuter car spaces, one for disabled use, two for station staff use and one for emergency vehicle parking access. Other informal commuter car parking and short-term parking is to be provided along Station Street and Nepean Highway. These car parking spaces will be placed on the new deck structure, to the south of Bondi Road, which will be accessed via Station Street. Disabled person access compliant under the *Disability Discrimination Act 1992* will be provided to the new station island train platforms, via a lift located just north of the Bondi Road crossing.

(iv) Evidence and submissions

Ms Kirralee Ashworth-Collett (Submission 10) requested increased bicycle parking and car parking for access to local shops.

Mr Warrick Oakley (Submission 31), Mr Peter Sandall (Submission 64), Ms Caroline Newman (Submission 94), Ms Jackie Gadsby (Submission 154), Ms Lisa Klusik (Submission 159),

Pascale Bicque (Submission 182), Mr George Paschalidis (Submission 198), Kerry Payne (Submission 209) and Mr Peter McGowan (Submission 234), requested provision of adequate car parking for commuters and the local area.

Ms Natalie Roberts (Submission 143) expressed concern regard the conceptual design for the Projects and limited provision of access requirements for disabled persons:

> *Forecourt has a ramp, elevator and stairs. But very limited car parking options (3 spaces ??). The bulk of the parking is on the desk (opposite side of road) with only stair access to the platform. This means families with pram, wheelchair users, the aged & those with mobility issues need to cross the busy road to enter the station on the opposite side. Please consider relocating the elevator to the deck side.*

Kingston Conservation and Environment Coalition (Submission 28) expressed concern about disabled persons access for the Projects and raised the issue, that a rail trench would reduce possibilities for parking places for Edithvale.

Mr Adrian Barker (Submission 163) asked for a design modification, to increase station parking and to provide for 'kiss and ride' facilities.

Mr Steve Hunt gave the following evidence in relation to parking and the submissions received:

- There were opportunities for additional on-street vehicle parking along Nepean Highway and Station Street, which would depend on future discussions with Council and VicRoads
- Proposed decked parking areas for the Projects (at the southern end of the reconstructed station platforms) through stair access, will provide for an improved connection between parking areas to station platforms, in comparison to the existing situation for both stations
- When considering disabled persons access between commuter parking areas and the station platforms needed to be further considered through EPRs T1, T5, T6 and UD1.

LXRA provided a witness statement from Dr Mandke, who acted as the Technical Lead for the social impact assessment from the EES. Dr Mandke gave evidence, in response to submission 143, that the feasibility for the location of elevators, or improved access to station elevators is to be further considered across detailed design through EPRs T3 and EPR UD1.

Mr Kevin Begg (AECOM GHD JV), provided evidence in relation to urban design. Mr Begg currently has a place on LXRA's Urban Design Advisory Panel and provided a response to Submission 28, related to disabled access issues. Mr Begg indicated that access to stations is guided by the Disability Standards for Accessible Public Transport, where Public Transport is a service also covered under the *Disability Discrimination Act*. These requirements call up a 'universally inclusive design' to ensure that design provides universal access to the Projects and their surrounds. He indicated that EPRs related to urban design (UD1 and UD2) are appropriate to manage and/or mitigate adverse environmental effects to parking and accessibility from the Projects.

(v) Discussion

Existing station-specific vehicle parking spaces will be generally replaced ('like for like') by spaces provided with the future construction of the new station decks (south of both stations). For the Edithvale Project, 34 car spaces will be provided. For the Bonbeach Project, 35 car spaces will be provided.

Mr Steve Hunt offered that for the rail trench design with the Projects, the opportunities for provision of additional car parking spaces elsewhere above these proposed replacement parking space numbers was limited. Mr Hunt noted that there are, however, opportunities for additional on-street parking along Nepean Highway and Station Street, where further discussions with Council and VicRoads will be required to facilitate such additional parking space numbers.

The State-appointed contractors and LXRA are to continue with consultation with stakeholders: Council, VicRoads and the community.

Relevant EPRs associated with 'Traffic' that relate to vehicle parking include:

- T1 (Transport Management Plan), sub-points: (d, e, f and m)
- T2 (Public Transport Disruption Management Plan) in relation to bus stop placements
- T5 (Car Parking), which calls up no net loss in station car parking for rail users upon completion, where car parking is to be replaced or reinstated at the earliest opportunity
- T8 (Emergency Services).

The EPR UD1 associated with 'Urban Design Guidelines' also will have some influence on vehicle parking provision:

It expected that an adequate supply of bicycle parking will be provided for the Projects, via the placement of new parkiteer structures (or similar).

The IAC shares the concerns from some submitters about the lack of 'kiss and ride' parking facilities, and trusts that this will be examined in the design development phase. The IAC believes that EPRs adequately enable this.

The IAC also shares the concerns raised by submitters about the number of commuter spaces in the area. While the Project requirements are simply to replace any lost commuter spaces, the IAC believes this is short sighted and the opportunity should be taken to examine options to increase the supply of on street and off street car parking close to railway stations.

(vi) Findings

The IAC makes the following findings in relation to impacts on Parking:

- **The proposed EPRs in relation to transport and parking are considered suitable for the Projects.**
- **The IAC notes that close consultation is required between the contractors for each Project and LXRA with Council, VicRoads and the community leading into detailed design.**

- **LXRA, Council, Transport for Victoria and VicRoads should review parking provision along the corridor and take advantage of opportunities that may arise out of the Projects to increase both off street and on street parking.**

12.4 Noise

(i) The issues

Chapter 8.2 of the EES (Vol 1), details issues related to noise and vibration from the Projects. Technical Report H in the EES (Vol 2) covers noise and vibration. Issues associated with noise and vibration for the construction phase of the Projects is discussed under Chapter 13. Key issues associated with noise during operation include:

- Noise and vibration have potential to cause annoyance to the community
- Reduced amenity near the Project Areas.

(ii) What are the risks?

Key risks include:

- Changes to traffic flows for the new level crossings may result in increased noise impacts
- Night time or day time operational noise exceeds limits causing loss of amenity for sensitive receptors
- Vibration from rail line operations exceeds acceptability limits, that may result in a loss of amenity.

(iii) EES documentation

The EES outlines how alterations to existing noise and vibration levels from operational trains may occur, in association with future train movements. The EES considered the impacts from these changes to sensitive receptors (residences, aged care centres and schools). The closest sensitive receptors are the residences along Nepean Highway and Station Street.

Existing noise to these receptors was monitored, and is largely dominated by road traffic originating from Nepean Highway and Station Street. Current noise levels are typical to that experienced by residents living adjacent to busy roads.

Vibration monitoring effects of passing trains, recorded from distance of six metres from the existing rail track, showed that existing vibration levels for Edithvale and Bonbeach were below the level at which adverse comments are generally reported (as defined by British Standard, BS6472 – 1: 2008).

Predicted noise and vibration exposure risks for the Projects (both day time and night time noise and vibration impact on amenity) were all rated as negligible.

- The EES predictive noise modelling covered both electric and diesel passenger trains and diesel locomotive freight trains. Lowering of the rail line into the trenches will create a shielding effect to noise. The Projects are expected to result in a lowering of average noise levels when compared to current levels, both due to the rail trench shielding effect and level crossing warning signal removal. Electrical sub-stations and new station public address systems are to be designed such that their noise

generation meets the requirements of State Environment Protection Policy 'N-1' limits

- Operational vibration effects are not expected to be any higher when compared to existing conditions. At distances of greater than 15 metres from the rail line, vibration levels are predicted to be below the levels likely to cause an impact to sensitive receptors.

(iv) Evidence and submissions

LXRA provided a witness statement from Mr Kym Burgemeister (ARUP), who conducted independent peer review of the noise and vibration impact assessment from the EES. Mr Burgemeister gave evidence that the standards and guidelines used in the assessment were appropriate for the Projects. Mr Burgemeister agreed that operational rail noise is likely to be reduced from the rail trench placement and that rail vibration would be unlikely to be significant at the expected separation distances between the rail line and sensitive receptors. Mr Burgemeister indicated that the proposed EPRs relating to noise and vibration, as well as the relocation policy covered under EPR SC2, should provide a suitable means of managing noise and vibration issues.

Mr Noel Matthews (AECOM GHD JV) provided evidence in relation to land use and planning. Mr Matthews relevant findings in relation to noise and vibration issues for operation were that the EPRs were comprehensive and relevant to the Projects.

Most of the submissions related to either noise or vibration were associated with the rail over road design concept for both Projects (which is not a valid design option as described by the EES).

(v) Discussion

Advice from Mr Kym Burgemeister was that the operational noise and vibration measurement and modelling provided a reasonable estimation of the levels of noise and vibration to be generated from the Projects. Operational noise is expected to reduce through use of the rail trenches and railway vibration is unlikely to prove a significant impact given the existing separation distances of sensitive receptors from the rail lines.

Mr Burgemeister indicated the proposed EPRs would present a reasonable, performance-based set of management and mitigation measures across these risks. The IAC notes that the recommendations offered by Mr Burgemeister for EPR NV3 and EPR SC2 have been generally adopted by LXRA.

(vi) Findings

The IAC makes the following findings in relation to impacts on Noise:

- **Operational noise and vibration EPR NV1, and the relocation policy covered under EPR SC2 (Respite and Relocation Policy) provide for a suitable means of managing noise and vibration issues.**

12.5 Visual impact

(i) The issues

The potential visual impacts associated with the Project include:

- light spillage, leading to loss of visual amenity and disturbance to fauna
- change in landscape character in the infrastructure corridor and commercial, residential, open space and foreshore areas
- visual impacts of new pedestrian overpasses (Edithvale and Bonbeach) and substation (Bonbeach) leading to perceived loss of visual amenity by residents or the community
- visual impacts of other changes to rail infrastructure resulting in perceived loss of visual amenity by residents or the community
- loss of visual amenity by residents or the community as a result of the removal of existing vegetation from the Project areas
- loss of visual amenity by residents resulting from the relocation of power poles to the eastern side of station street
- increased risk of graffiti due to more extensive areas of hard surfaces such as crash barriers, leading to loss of visual amenity by residents and the community.

(ii) EES documentation

Chapter 8 (Section 8.10) of the EES summarises the Landscape and Visual Impact Assessment undertaken by AECOM GHD. The full assessment is presented in EES Technical Report J – Landscape and Visual Impact Assessment (LVIA).

The EES provided an assessment of likely potential impacts of the Projects on identified landscape zones and five different receptor types: residents, recreational users, commercial users, road users and rail users.

The LVIA found that the existing rail corridor forms part of a visually dominant north-south infrastructure corridor running through the project areas, in conjunction with Station Street and the Nepean Highway. The infrastructure corridor runs parallel to Port Phillip Bay, which is about 200 metres to the west, and includes shrubs and trees that reflect the broader coastal landscape character. Beeson Reserve is situated opposite Edithvale Railway Station and forms a link between the foreshore and Nepean Highway.

The LVIA found that:

- No landscape character zones in the Project areas would be subject to high visual impacts
- Moderate visual impacts would occur for the infrastructure corridor, primarily due to the loss of existing vegetation and hard rail infrastructure occupying more of the rail corridor
- One visual receptor location would be subject to high visual impacts, at the corner of Station Street and Cannes Avenue (Bonbeach Project Areas) (V09)
- Four visual receptor locations would be subject to moderate visual impacts, these being:
  - V01 – residential receptors located on the Nepean Highway
  - V07 – residential receptors located on Station Street

- V08 – residential receptors located at the corner of Station Street and Fraser Avenue
- V09 – rail travel receptors located at Edithvale Station.

The EES proposed the following five EPRs to assess visual impacts:

- LV1 – Landscape and visual opportunities
- LV2 – Lighting
- LV3 – Light spillage
- UD1 – Urban Design Guidelines
- UD2 – Hoardings.

The EES made the following finding in relation to visual amenity:

> *The areas surrounding the projects are highly valued for their coastal setting. The projects would change the visual appearance of the transport corridor through Edithvale and Bonbeach by replacing the existing at-grade rail infrastructure with a modern station building and precinct, car parking on deck, footbridges, safety barriers along the trench and a substation at Edithvale. Although vegetation would be lost, new landscaping would be established.*
>
> *The urban design of the projects would be guided by a comprehensive set of Urban Design Guidelines.*

(iii) Evidence and submissions

LXRA called evidence from Mr Kevin Begg in urban design and presented visualisations of the rail corridor by Urban Circus. Mr Begg outlined LXRA's Urban Design Framework and local Urban Design Guidelines and explained the key role of these documents in framing design response to impacts on visual amenity.

Many submissions were received in relation to visual impacts, including from Council, local community groups (including Chelsea Bonbeach Train Station Group, Kingston Conservation and Environment Coalition and No Sky Rail: Frankston Line Community Association Incorporated) and local residents.

Council's submission raised concerns about inadequate assessment of urban heat and visual amenity impacts as a consequence of the removal of vegetation from the railway corridor. Council submitted that the station design should include consideration of resilience, comfort and replacement plantings.

Other submissions regarding visual impacts covered the following matters:

- Concerns about the visual impact of extensive concrete surfaces[213]
- Concerns about graffiti and requests for design approaches that reduce opportunities for graffiti[214]
- Requests that provision be made for landscaping, including the use of trees (rather than just shrubs) and native plants as well as green walls where space is limited[215]

213 Submission Nos. 1, 41, 135

214 Chelsea Bonbeach Train Station Group and Submission Nos. 1, 41, 44, 53, 73, 145, 178, 179, 181, 192

215 Chelsea Bonbeach Train Station Group, Kingston Conservation and Environment Coalition and Submission Nos. 1, 6, 51, 70, 145, 147, 178, 187, 199, 222, 231

- Requests that local design elements be incorporated as part of the Projects, including references to a coastal theme [216]
- Concerns about the design of the new stations being ultra-modern and subsequently becoming dated [217]
- Chelsea Bonbeach Train Station Group submitted that the design and décor of each station should be unique to provide visual cues to help passengers alight at the correct station
- Concerns about the visual impacts of the substation, including requests that the substation have a similar façade as the station complex[218] and be situated closer to the main activity area to reduce risks of vandalism[219]
- Concerns about light spill from the proposed new car park affecting nearby residences[220]
- Concerns about the relocation of power poles affecting residents[221]
- Concerns about the visual impact of pedestrian overpasses, especially the proposed pedestrian overpass at Berry Avenue [222].

No specific changes to EPRs LV1, LV2, LV3 or UD2 were proposed in submissions or at the Hearing.

As discussed in Section 12.7 (vegetation removal), Council proposed that EPR UD1 should be amended to address its concerns regarding vegetation loss from the project areas by inserting the following two additional matters to be considered by the Urban Design Guidelines:

i. resilience and comfort for the community in a climate change future

j. vegetation replacement as a design and development component

Ms Dwyer submitted that the design process should ensure that the option of replacing existing pedestrian crossings with underpasses is given full consideration (see Section 12.2).

(iv) Discussion

The submissions on visual impacts indicate that there is strong interest in this issue from the local community.

The IAC notes the advice provided in LXRA's Part A Submission and evidence from Mr Begg that there will be a detailed urban design assessment as part of the broader detailed design phase. That assessment will include consideration of views of a range of stakeholders and will be carried out in consultation with the Office of the Victorian Government Architect.

The IAC notes that no specific changes to EPRs LV1, LV2, LV3 or UD2 were proposed in submissions or at the Hearing and recommends that the version of these EPRs exhibited in the EES be adopted.

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216 Chelsea Bonbeach Train Station Group and Submission Nos. 6, 10, 32, 135, 136, 145, 163,178, 187, 209, 238, 239

217 Submission No. 174

218 Submission No. 187

219 Submission No. 231

220 Submission No. 231

221 Submission No. 241

222 Submission Nos. 178, 187, 217, 218, 231; Ms Tamlyn Dwyer also presented a detailed submission on this matter at the Hearing

(v) Findings

The IAC makes the following findings in relation to visual impacts:

- **The IAC generally agrees with the key findings of the EES in relation to visual amenity.**
- **The IAC recommends that EPR UD1 be amended as submitted by Council by adding the following two clauses:**
  - ***i. resilience and comfort for the community in a climate change future;***
  - ***j. vegetation replacement as a design and development component.***
- **The IAC's preferred version of the EPRs are presented in Appendix E.**
- **The IAC notes the concerns expressed by residents regarding the visual impact of a pedestrian overpass at Berry Avenue and recommends that the Urban Design Guidelines should enable consideration a pedestrian underpass at Berry Avenue as an alternative option.**

12.6 Historic and Aboriginal cultural heritage

12.6.1 Historic heritage

"*Historic heritage refers to built form and archaeological remains of buildings and places dating from after European settlement*"[223], as distinct from Aboriginal cultural heritage, which is discussed separately (Section 12.6.2).

(i) The issues

The potential historic heritage impacts associated with the Projects include:

- The potential for disturbance of historic heritage during construction, including identified and non-identified historic heritage
- The potential for ongoing visual impact on historic heritage.

(ii) EES documentation

Chapter 8 (Section 8.4) of the EES summarises the Historic Heritage Impact Assessment undertaken by Lovell Chen. The full assessment is presented in EES Technical Report N – Historic Heritage (Lovell Chen).

The Lovell Chen assessment found that the Project areas "*do not include, nor adjoin, any heritage places listed on the National Heritage List, Commonwealth Heritage List, Victorian Heritage Register or Victorian Heritage Inventory*" (EES p 8.25).

The EES indicates that no sites of historic heritage will be demolished or removed during construction. The existing Edithvale and Bonbeach railway stations have not been identified as heritage places.

The EES indicates that there are no known archaeological sites listed on the Victorian Heritage Inventory within the Project areas, but there is potential for archaeological values to exist. The EES proposes EPR HH1 to minimise impacts on unidentified historical archaeological sites and values by developing and implementing an archaeological discovery and management protocol.

[223] EES p 8.24

Two sites of local heritage significance were identified within the Project areas but outside of the construction areas. Both are covered by Heritage Overlays in the Kingston Planning Scheme. They are the Chelsea Clock Tower in the Edithvale project area (HO28) and the Chelsea Railway Station in the Bonbeach project area (HO31). The EES proposed EPR HH2 to avoid adverse impacts on the Chelsea Clock Tower and the Chelsea Railway Station by implementing no-go zones and undertaking a pre-condition survey.

Each of the Project areas is adjacent to three Heritage Overlay sites as well as several places of potential heritage significance. The EES proposed EPR HH3 to avoid or minimise adverse visual impacts on adjoining heritage places by applying the Urban Design Framework and specific urban design guidelines. The LXRA Urban Design Framework (Version 4 May 2018) Objective 1.3 set out the expectation that works should "*Respect and respond to indigenous and non-indigenous cultural heritage and local history*."

(iii) Evidence and submissions

LXRA submitted an expert witness report from Katherine White, the principal author of EES Technical Report N. Ms White confirmed that she had not undertaken any further work in relation to the matters addressed in the Technical Report relevant to the project. Ms White did not appear at the hearing.

Margaret Ann Hunter submitted that it would be desirable for historic and environmental information boards or displays to be incorporated into the Projects[224]. LXRA submitted that this is a matter that is more appropriately addressed in the design phase[225].

(iv) Discussion

The IAC notes that historical and environmental displays would be consistent with Principle 1 of LXRA's Urban Design Framework, which states that "*A well-defined identity and sense of place is key to creating strong and vibrant communities*". However, it agrees with LXRA that this is a matter for the detailed design phase.

(v) Findings

The IAC makes the following findings in relation to historic heritage:

- **The IAC accepts that EPRs HH1 to HH3 (together with the associated EPRs that they cross-reference) will adequately mitigate any potential impacts on historic heritage.**

12.6.2 Aboriginal cultural heritage

(i) The issues

The potential Aboriginal cultural heritage impacts associated with the Projects include:

- The potential for adverse effects on Aboriginal cultural heritage as a result of ground disturbance during construction.

[224] Submission No. 3

[225] LXRA Part C para 73(a)

(ii) EES documentation

Chapter 8 (Section 8.6) of the EES summarises the Aboriginal Cultural Heritage Impact Assessment undertaken by Andrew Long and Associates Pty Ltd. The full assessment is presented in EES Technical Report M – Aboriginal Cultural Heritage (Andrew Long and Associates Pty Ltd).

The EES assessment found that there are no registered Aboriginal cultural heritage places in the Edithvale or Bonbeach project areas. There are two registered Aboriginal cultural heritage places within one-kilometre of the project areas. Both are low density artefact distributions situated within one kilometre of the Edithvale project area. Their presence suggests that other Aboriginal cultural heritage may potentially exist in the Edithvale and Bonbeach areas. The EES indicates that this will be investigated during the preparation of a Cultural Heritage Management Plan in accordance with the *Aboriginal Heritage Act 2006*.

The EES proposed one EPR relating to Aboriginal cultural heritage, EPR AH1:

> *Cultural Heritage Management Plan*
>
> *Comply with and implement any Cultural Heritage Management Plan approved under the Aboriginal Heritage Act 2006 that applies to the projects.*

(iii) Evidence and submissions

LXRA submitted an expert witness report from Mr Ricky Feldman, the lead author of EES Technical Report M. Mr Feldman confirmed that he had not undertaken any further work in relation to the matters addressed in the Technical Report relevant to the project. Mr Feldman did not appear at the Hearing. No issues of concern were raised in submissions regarding Aboriginal cultural heritage.

LXRA has indicated that it proposes to prepare a Cultural Heritage Management Plan in accordance with the *Aboriginal Heritage Regulations 2007* for approval in accordance with the *Aboriginal Heritage Act 2006* prior to the commencement of any works[226]. LXRA has lodged notice of intent to prepare a cultural heritage management plan for the Projects (CHMP 15158) and will finalise the plan and submit it for approval, subject to the Minister for Planning's assessment of the EES.[227]

(iv) Discussion

Aboriginal cultural heritage was not raised as a significant issue in the submissions. The IAC notes that a CHMP will be prepared for the project outlining the steps to protect and manage Aboriginal cultural heritage.

(v) Findings

The IAC makes the following findings in relation to Aboriginal cultural heritage:

- **Given that a CHMP has not yet been prepared and to ensure that a CHMP is completed, it is proposed that EPR AH1 be amended by adding the following statement:**

226 LXRA Part A para 97; EES page 8.29

227 LXRA Part A para 98

Prepare a Cultural Heritage Management in accordance with the Aboriginal Heritage Regulations 2007 for approval in accordance with the Aboriginal Heritage Act 2006.

- **This has been included in the IAC's preferred version of the EPR AH1 in Appendix E.**

12.7 Vegetation removal

Existing vegetation in the Project areas is proposed to be cleared to enable construction. The rail trench and underground stations will provide minimal opportunities for vegetation replacement.

(i) The issues

The potential impacts of the Projects on the Ecology of the project areas resulting from the removal of vegetations for construction works include[228]:

- Removal of native vegetation in the project areas, reducing the extent of native vegetation in Victoria[229]
- Removal of protected flora species[230]
- Loss of habitat for fauna in the project area, potentially leading to the displacement, injury or death of wildlife protected under the Wildlife Act[231]
- Habitat fragmentation, resulting in exacerbation of a threatening process listed under the FFG Act[232]
- Loss of visual amenity
- Increased urban heat.

(ii) EES documentation

Chapter 8 (Section 8.11) of the EES summarises the assessment of impacts on the project areas undertaken by AECOM GHD. The full assessment is presented in EES Technical Report D – Ecology: Project Areas (AECOM GHD). The EES investigations included desktop reviews of government-curated biodiversity datasets, field assessments, determination of likelihood of threatened species presence and vegetation quality assessment of native vegetation patches[233].

The EES indicates that much of the original native vegetation in the project areas has been historically cleared, but there are long linear patches of vegetation (remnant and planted) along the edges of the railway corridor. The 2.20 hectares of remnant native vegetation in the Project areas includes 1.15 hectares in the Edithvale project area and 1.05 hectares in the Bonbeach project area. It consists mainly of Coast Banksia Woodland (EVC 2 – 96 per cent) with four small patches of Coastal Dune Scrub (EVC 160 – 4 per cent). There are also four scatted trees. The Project areas are situated within the Gippsland Plains Bioregion. The bioregional conservation status of Coast Banksia Woodland (EVC 2) is 'vulnerable' and Coastal Dune Scrub (EVC 16) is 'depleted'. These ecological communities are not listed as

228 Technical Report D, p 43-44
229 Technical Report D, p 43
230 Technical Report D, p 43
231 Technical Report D, p 43
232 Technical Report D, p 44
233 Technical Report D, p 14

threatened under the EPBC Act or the *Flora and Fauna Guarantee Act 1988* (FFG Act). In addition to the remnant native vegetation, the Project areas also have planted vegetation that includes indigenous and exotic species.

Three plant species listed as protected under the FFG Act were observed during the EES fieldwork[234]:

- White sallow wattle (*Acacia floribunda*)
- Coast wattle (*Acacia longifolia subsp. Sophorae*)
- Cotton fireweed (*Senecio quadridentalis*).

The EES reports that vegetation quality throughout the project area has been impacted by weed invasion and disturbance associated with management of the rail corridor. However, the EES notes that vegetation maintenance is being carried out by the local community, particularly in the vicinity of Bonbeach and Edithvale stations, and acknowledges the social and amenity value of the vegetation.

The Projects will require the removal of the existing vegetation from the Project areas. This is unavoidable. The EES is based on the removal of all existing vegetation although it indicates that opportunities to retain some of the existing vegetation may be found during the design process.

The EES indicates that vegetation removal will result in loss and fragmentation of habitat for fauna. It reported that no threatened fauna species are known to live in the vegetation in the Project areas. However, the vegetation along the rail corridor would function as a habitat corridor, facilitating the movement of fauna through the urban landscape. Habitat fragmentation is listed as a 'potentially threatening process' under the FFG Act.

The EES determined that the residual risks (with proposed EPRs) arising from vegetation removal within the project areas were minor.

The EES proposed the following EPRs to address the potential impacts arising from vegetation removal:

- EPR FF1 – Native vegetation and habitat
- EPR FF2 – FFG Permits
- EPR FF4 – Fauna
- EPR FF6 – Landscaping for wildlife
- EPR UD1 – Urban Design Guidelines.

(iii) Evidence and submissions

Submissions relating to vegetation removal were received from Council and the Chelsea Bonbeach Station Group. Evidence was presented by two expert witnesses:

- LXRA called Mr Cameron Miller, the principal author of EES Technical Report D. Mr Miller confirmed to the panel that his assessment presented in Technical Report D remained current
- Council called Dr Jeff Yugovic of Biosis.

Dr Yugovic noted that the native vegetation in the Project areas has considerable landscape importance or social value[235].

234 Technical Report D, Appendix C

235 Dr Yugovic, p. 8

Council submitted that the loss of the vegetation from the project areas (as well as the natural ground) would lead to loss of visual amenity and increased risk of urban heat that was not addressed in the EES[236]. LXRA's expert witness, Mr Miller confirmed that "*consideration of urban heat and visual amenity risk was outside the scope of the ecological investigation*"[237].

Chelsea Bonbeach Station Group submitted that that they were concerned about visual impacts of the vegetation removal and noted that they had worked for a decade to improve the Bonbeach Station Precinct[238]. Chelsea Bonbeach Station Group, Kingston Conservation and Environment Coalition and many local residents made submissions regarding the importance of vegetation to visual amenity, as discussed in Section **Error! Reference source not found.** (Visual Impact).

Council recommended that:

> *Station design and landscaping should include a consideration of resilience and comfort for the community in a climate change future and include in depth consultation about this and vegetation replacement during design[239].*

Mr Miller's response indicated that:

> *This issue of landscaping for resilience to climate change is outside the scope of the ecological investigation … any offsetting will be undertaken in line with relevant DELWP policy. At this stage, my understanding is there is no intention to offset the loss of vegetation within the project area. Landscaping would not form part of offsets for native vegetation[240].*

Council proposed that EPR UD1 should be amended to address its concerns by inserting the following two additional matters to be considered by the Urban Design Guidelines:

i. resilience and comfort for the community in a climate change future

j. vegetation replacement as a design and development component

Dr Yugovic queried the vegetation mapping of the Project areas presented in the EES, submitting that the areas mapped as Coastal Dune Scrub (EVC 160) is more likely to be modified Coast Banksia Woodland (EVC 2) that had lost its banksia overstorey.

The finding of the EES in relation to native vegetation was the (unavoidable) loss of native vegetation "*would be substantially minimised in finalising project designs and construction methodologies, clearing only what is necessary, and offsetting the impacted vegetation in accordance with Victorian Government policy*."

(iv) Discussion

The IAC accepts that local vegetation and habitat loss is unavoidable if the rail trench proceeds and notes the concerns regarding visual and amenity impacts. It accepts the proposed changes to EPR UD1 proposed by Council to address these concerns.

236 Submission No. 226, p. 3
237 Miller expert witness report, p 17
238 Submission No. 1.
239 Submission No. 226, p. 3
240 Miller expert witness report, p. 17

(v) Findings

The IAC makes the following findings in relation to vegetation removal:

- **The IAC agrees with the finding of the EES that loss of native vegetation can be minimised through design and that losses can be appropriately offset.**
- **The impacts of vegetation removal should be addressed by EPRs FF1, FF2, FF4, FF6 and UD1.**
- **EPR UD1 should be amended by the additional clauses (i) and (j) proposed by Council. These changes have been included in the IAC's preferred version of EPR UD1 in Appendix E.**

13 Construction impacts

13.1 Background

Access and temporary construction activities will be required for:

- Parts of the surrounding road network for which VicRoads or Council are the managing authority
- Other Council lands temporarily required for construction and ancillary works associated with road modifications and surface drainage.

Key construction activities for the Project(s), which sit within the scope of the EES and required approvals include:

- Excavation for piling, foundations and rail trenches
- On-site waste management (removal, management and disposal of excavated soil, rock and collected waters)
- Spoil transport and collected waters off-site (for appropriate disposal)
- Construction of groundwater control mitigation measures (passive horizontal drain, or similar)
- Demolition of the existing stations and removal of existing rail and road/parking infrastructure
- Construction of bridge/deck structures, to support new vehicular crossings
- Construction of the tanked concrete rail slab, including its related stormwater holding tanks (beneath the slab)
- Construction of rail station infrastructure, including platforms and buildings
- Construction of supporting pedestrian crossings and access points
- Installation and commissioning of new rail infrastructure (ballast, overhead power equipment and rail lines).

13.2 The issues

LXRA has undertaken impact assessment studies for the EES in relation to project construction, the following key disciplines for consideration cover across:

- Noise and vibration
- Dust and air quality
- Traffic/transport
- Business
- Land contamination and spoil management
- Settlement
- Water management.

13.3 EES documentation

The EES used the risk-based assessment approach across various identified environmental aspects associated with construction. This required establishing a set of suitable baseline conditions, to allow evaluation of potential residual effects from the Project(s), as well as assisting to assess for efficacy of suggested environmental management and mitigation measures.

The key findings of the EES in relation to construction impacts were:

Construction would result in localised amenity impacts related to noise and transport network disruption, but can be managed effectively using well established practices.

The potential impacts to the community during the construction of the two projects are typical of any construction project.

Comprehensive environmental and traffic management plans would be implemented to ensure legislative and policy requirements are met, and an extensive program of community and stakeholder consultation would be undertaken prior to and during construction to ensure that the community, particularly residents and businesses that may potentially be directly affected, are aware of upcoming works and are able to plan their activities

Noise and vibration

A noise and vibration impact assessment (Technical Report H) was conducted. The closest, sensitive noise receptors to the Project Areas, are residential properties along Nepean Highway and Station Street. Monitoring stations near existing rail lines assessed typical vibration conditions from passing electrical passenger trains and diesel freight trains. Passenger trains were observed to provide the highest vibration dose values, where passenger trains currently are unlikely to affect amenity for nearby sensitive receivers.

The impact assessment assumed deployment of noise and vibration management and abatement measures as outlined in the EPRs. Piling was expected to provide the highest potential noise and vibration impact:

- 'Negligible' risks were associated with unplanned daytime construction noise and vibration effects, possibly causing structure damage with construction
- 'Minor' risks were associated with normally anticipated daytime construction noise, construction equipment vibration causing some loss of amenity to receptors and unplanned works at night, where loss of amenity would occur to sensitive receptors
- The highest risk (rated 'moderate') was associated with night-time construction noise where a loss in amenity would occur.

Relevant, EPRs in relation to the control of noise impacts included:

- EPR NV 2 (Construction Noise)
- EPR SC1 (Community and Stakeholder Engagement Management Plan)
- EPR SC2 (Respite and Relocation Policy).

Relevant, EPRs in relation to the control across vibration impacts included:

- EPR NV 2 (Construction Noise)
- EPR SC1 (Community and Stakeholder Engagement Management Plan)
- EPR GM1 (Pre-construction Condition Surveys).

Key mitigation measures are expected to include careful scheduling of construction activities likely to cause higher levels of disturbance, community consultation and selection of construction methods that provide for lower noise or vibration impacts.

Dust and air quality

Air Quality is covered in Technical Report I.

Construction emissions are expected to include dust and those associated with engine combustion. Dust impacts may occur through material transfer, vehicle movement on loose soil surfaces, or wind erosion from exposed soil surfaces and stockpiles.

Potential sensitive receptors to the Project(s) include residential premises (typically one to two–storey) and recreational parks and open spaces. Nepean Highway and Station Street provide separation of sensitive receptors from the rail corridor.

The use of reactive management and mitigation measures linked to a suitable monitoring program are described by the EPRs. The general plans and procedures from: EPA Victoria (1996) Publication 480, provides the framework for expected management and mitigation measures.

EPRs in relation to the control of construction dust and air quality impacts include:

- EPR AQ1 (Air Quality - Construction) – Manages construction activity to minimise dust, odour and other emissions in general accordance with EPA Victoria (1996) Publication 480
- EPR AQ2 (Air Quality - Management) – Seeks to control emissions of smoke, dust, fumes and other pollutants to the atmosphere by complying with SEPP-AQM and SEPP-AAQ
- EPR CL2 (ASS Management Plan) – refer to Section 6
- EPR CL3 (Waste Management) – see separate discussion on Land Contamination and Spoil Management (this Section).

Traffic

Traffic Impact Assessment is covered in Technical Report G.

For the first half of the 'Main Occupation', construction related vehicle movements to the project(s) of between 2,600 to 3,200 trips to and from site apply (mainly from spoil cartage trucks). The latter half of the Main Occupation will see a reduction in construction traffic of between 800 to 1,200 trips to and from site (mainly workforce vehicles and material delivery). Laydown construction areas (within each Project Area) may also add separate traffic (across the first half of the Main Occupation, with additional construction vehicle movements of between 300 to 500 trips to and from).

Key traffic construction routes proposed for the Edithvale Project are expected to use Edithvale Road (both directions), Nepean Highway moving south (Alexandra Street to Bristol Avenue) and Station Street moving north (Berry Avenue to Lochiel Avenue).

Key traffic construction routes proposed for the Bonbeach Project are expected to use McLeod Road (both directions), Station Street moving north (using the direct bridge link connection across the Patterson River) and Nepean Highway, moving southwards (Chadwell Grove to the Carrum Station level crossing).

The Frankston rail line will be closed at certain times between Mordialloc and Frankston Stations. The rail line is expected to be closed for a six–week period across the Main Occupation and at other certain times (for shorter durations, during week-end or overnight periods). When this occurs, buses will be used to replace trains between the closed route.

Road lane closures (either full or partial lane closures) including current cycling lanes will be required for Nepean Highway and Station Street at certain times during construction.

Certain pedestrian crossing closures and footpath closures will also be required across construction.

The construction impact assessment assumed management and mitigation measures as outlined in the EPRs:

- Negligible risk was associated with plant and spoil trucks depositing dirt and construction debris on roads (dust, loss of amenity and public safety issues)
- Minor risk was associated with traffic delays for periods outside of 'Main Works' (applies to pile placement and Main Occupation periods)
- Minor risk was associated with traffic road safety, from construction disruption to the traffic network and increase in traffic volumes, leading to increased traffic accidents
- The highest risk (rated as moderate) was associated with traffic delays associated with Main Works.

EPRs in relation to construction include:

- EPR T1 (Transport Management Plan) – to be prepared prior to construction (excludes Preparatory Works). This aims to minimise disruption across: land use, traffic, car parking, on-road public transport, pedestrians, bicycles and usage of existing public facilities. The plan is required to be developed in consultation with relevant road management authorities, where it is to be supported by an adequate level of transport analysis
- EPR T2 (Public Transport Disruption Management Plan) – to be prepared with consultation through relevant groups prior to construction. Covers works from the Project(s) expected to significantly affect public transport services
- EPR T3 (Pedestrian and Cyclist Connectivity) – aims to optimise the Project(s) design, matched to LXRA's Urban Design Guidelines for maintenance and enhancement of pedestrian and bicycle connectivity, under consultation with relevant authorities
- EPR T6 (Vehicle and Pedestrian Access) – for those pedestrian access points altered during construction, access is to be replaced in accordance with relevant road design standards
- EPR T7 (Debris on Roads) – Minimises dirt and debris on roads
- EPR T8 (Emergency Services) – Both vehicular and pedestrian access is to be maintained across the construction to hospital emergency departments and other key health and medical facilities. Access requirements for other emergency services groups is covered in EPR T1.

Business

Business Impact Assessment from construction is covered in Technical Report K. The assessment covered the effect to the two rows (precincts) of commercial premises along Nepean Highway (west side), directly adjacent to the Edithvale and Bonbeach Stations (each Study Area covered an 800 metre radius from these stations). Most of these, fall into the 'small business' category.

Consultation with a cross-section of business stakeholders and Council representatives was conducted.

The key risk from construction is loss of access to customers, leading to a temporary loss of revenue. Overall this risk, assuming the EPRs are implemented, was rated as minor.

EPRs in relation to the business impact assessment for construction included:

- EPR B1 (Business Disruption Plan). This seeks to minimise business disruption and to integrate with the Community and Stakeholder Engagement Management Plan (EPR SC1). It covers:
  - Transport planning, prior to road and rail or pedestrian crossing closures, to minimise impacts to business access and parking (EPR T1)
  - The communication process with Precinct(s) businesses
  - How amenity impacts will be addressed (relates to: EPRs AQ1, AQ2, NV2 and NV3).
- EPR UD1 (Urban Design Guidelines). This calls up the LXRA Urban Design Framework and Project–specific Urban Design Guidelines. Involvement of the LXRA Urban Design Advisory Panel is also required
- EPR SC3 (Recreational Facilities) requires consultation and management across sporting clubs and land managers, where construction works directly impacts on the clubs or passive recreation users.

Land contamination and spoil management

During rail trench excavation and pile wall construction, it is likely that ASS and/or contaminated soil will be encountered. ASS are covered in Chapter 7.

The land contamination investigations were considered to provide a suitable indication of contamination status for soils and groundwater, such that reasonable estimates could be made of both the volumes and likely nature of material to be generated from the Project Areas. The EES estimates that approximately 11 per cent of the total soil material to be excavated by the Project(s) may prove to be contaminated, where most of this should classify as 'Category C' Material:

- These will be suitably classified under IWRG guidance, to allow for licenced off–site disposal, before they are excavated from Project Areas
- Contaminated spoil may then be directly loaded-out and trucked from the Project Areas, under tarpaulin cover, to limit odour, vapour and dust impacts to surrounds.

More–detailed land contamination investigations are proposed to be undertaken across detailed design and prior to major excavation work.

Settlement and subsidence

The EES discusses the potential effects of aquifer depressurisation of saturated sediments from aquifer damming and water table drawdown on the down–gradient (west) sides of the trenches. This can be associated with the consolidation settlement of compressible sediments, resulting in land subsidence effects to buildings, structures or other assets susceptible to subsidence.

The EES suggested that residual risk from the Project(s), assuming the mitigated approach for the Edithvale Project, would be negligible. Plans for suitable management and mitigation include:

- EPR GM1 (Pre-Construction Condition Survey) – for buildings, structures and other applicable assets, which may have some suggested risk of damage from ground effects (vibration, subsidence or ground movement), a process will be established to identify such assets, conduct pre–construction condition surveys of these assets and reporting of condition survey and monitoring results to the asset owners. This EPR will link with EPR SC1.
- EPR GM2 (Repairs to Properties Due to Vibration, Subsidence or Ground Movement) – from reporting via EPR GM2, for buildings, structures and other applicable assets deemed to have suffered distress or damage from the Project(s), this EPR sets out a means of rectifying such damage to the satisfaction of the asset owner.

Other related EPRs: GW1, GW2, GW3, GW4, GW5, NV3 and SC1 will assist in mitigating and managing these risks.

Water management

Potential key impacts from construction, relate to surface water run-off and pump-off from the Project(s), where waters are subject to acidification, high sediment loads or other pollutants:

- Trench dewatering
- Run–off from laydown areas, stockpiled soils, or soils being loaded for transported disposal.

It is likely that during pile wall and trench excavation that contaminated water may be encountered (either in the form of waters impacted by ASS, or other groundwater contaminants). Pile wall construction is expected to occur ahead of soil excavation for the trenches, which is expected to significant restrict potential for groundwater entry to the trenches (aquifer drawdown across this phase is expected to be minimal).

The following aspects were considered as having 'negligible' risk:

- interference to existing or future groundwater users
- impacts to beneficial groundwater uses
- induced migration of groundwater contaminants.

EPRs: GW1, GW3 and CL4 set specific groundwater management measures to confirm that these assumed risks remain as negligible.

For laydown and stockpiling areas outside of trenches, available management techniques include:

- Minimising volume and area of soil stockpiles and the time-span for forming stockpiles before off–site cartage and disposal
- Covering soil materials (for those with significant fines)
- Minimising those external catchment flows that may drain water into the Project Areas
- Use of bunding and silt fence controls around soil stockpiles and regularly monitoring pumped water quality from these areas.

Plans for suitable management and mitigation proposed by the EES include:

- EPR SW1 (Stormwater Management Construction): Under a Construction Environmental Management Plan (which considers the commonly used controls suggested within EPA Victoria (1996) Publication 480:
  - Water collected from trench(s) with construction, is to be treated, prior to discharge to the local stormwater network (under future to–be–arranged permit)
  - Water treatment quality requirements will be set to a compliant level through referral to SEPP-WoV.
- EPR SW3 (Drainage Network – Construction): Sets the control of water disposal quantity and quality from the trench(s), following a storm event using temporary pumps, where no adverse impact is to occur to the drainage networks in consultation with Council and Melbourne Water
- EPR SW5 (Flood Protection – Construction): Sets the control against construction dewatering and pumped water disposal from the trench(s), such that no increases in flooding (flood levels, flows and velocities) will occur from the Project(s) when considering overland flow paths, where compliance is called up with Council and Melbourne Water
- EPR CL3 (Waste Management): Provides for chemical management procedures across waste
- EPR CL4 (Acidic and/or Contaminated Groundwater (Construction)): Deals with either acidified or contaminated intercepted groundwaters across construction. This EPR calls up the compliance control set out via SEPP-WoV and State Environment Protection Policy – Prevention and Management of Contaminated Land (SEPP-PMCL), with reference to the associated guidance through EPA Victoria and water industry regulations, standards and guidelines.

The EES states that through these controls and with Council compliance, dewatering of the trench(s) following storm events is unlikely to result in a reduction in the capacity of the local stormwater drainage system (causing flooding). Surface water quality will be controlled through the need for compliance to be met to both SEPP-WoV and Council and Melbourne Water requirements.

13.4 Evidence and submissions

Noise and vibration

Mr Burgemeister from ARUP, called by LXRA, provided an expert witness statement related to the peer review process across noise and vibration aspects for the Project(s), but was not called to provide evidence at the Hearing.

EPA Victoria submitted in relation to EPR NV2 (Construction Noise), that the Construction Noise and Vibration Management Plan should include a procedure for managing detected exceedance. It referred to EPA Victoria (2008) Publication 1254 and how community consultation should be addressed, particularly around the topic of what EPA terms 'Unavoidable Works'. EPA Victoria requested that a clear rationale be established to ensure works considered as 'Unavoidable Works' at night, meet the definition as provided within this publication. They suggested that the Independent Reviewer should serve a role on this aspect, to address and approve actions around 'Unavoidable Works'.

Dust and air quality

Mr Cook from AECOM GHD JV, called by LXRA, provided an expert witness statement related to the air quality impact assessment conducted for the Project(s), but was not called to provide evidence at the Hearing.

EPA expected that an effective consultation process would be established with the surrounding community on air quality. It indicated the construction phase is expected to produce dust and other air emissions which will require management. It submitted that appropriate management of these temporary effects could be conducted using the guidance within EPA Victoria (1996) Publication 480. The EPA requested that an Air Quality Management and Management Plan be established to suitably address such impacts, where they offered to be involved in the review of said management plans. It requested that a suitable program of community consultation be established early, leading into construction.

Traffic

Mr Hunt from Ratio Consultants provided evidence for LXRA across traffic aspects.

Council requested consultation for development of the Spoil Management Plan. It suggested that priority should be provided to those end-placement sites for 'clean fill' located closest to the Project(s), to minimise the disturbance to the community along transport routes, and to assist in reducing carbon emissions with construction.

Ms Natalie Roberts (Submission 143), Mr Francis Williams, Mr Jim Stewart (Submission 151), Ms Christine Bakker (Submission 196), Ms Christine Bugbee (Submission 224) and Ms Mandy Stewart (Submission 237) all suggested acceptance that to facilitate the Projects and to improve the public transport system would necessarily involve some amount of disruption to the community and traffic flows across the construction phase.

Mr Wade Ransby (Submissions 191 to 193) discussed the Bonbeach project, where residents within Harding Avenue (from the foreshore zone) now often experience problems in accessing Nepean Highway, especially when turning right (towards Carrum). Mr Michael Hughes (Submission S24) and Mr Tim Wraight (Submission 101) provided argument that the Eel Race Road crossing point should not be closed in relation to the Bonbeach project.

Ms Kirralee Ashworth-Collett (Submission 10), Kingston Conversation and Environment Council (Submission 28), Mr Warrick Oakley (Submission 31), Ms Caroline Newman (Submission 94), Ms Natalie Roberts, Ms Jackie Gadsby (Submission 154), Ms Lisa Klusik (Submission 159) and Mr Wade Ransby all raised the general topic of street parking shortage in relation to the Projects.

Business

Chelsea Bonbeach Train Station Group discussed the importance of permeable roads and railway alignment to pedestrian traffic, and were concerned about potential impacts to businesses in the project(s) area:

- Population density is increasing, where a recent high and increasing proportion of units and townhouses continues to evolve for the area
- There is a current high dependence on walking access
- The Chelsea retail hub currently provides the required services for the community across: Edithvale, Bonbeach and Chelsea Heights through walking access

- There are also other key destination points west of Station Street and the Nepean Highway including: the beach, lifesaving clubs and the Chelsea Activity Hub
- Along Nepean Highway and Station Street, there are already some vacated businesses.

The Group argued that with the pending opening–up of the Station Street Bridge across the Patterson River (to the south of the project(s)), increased vehicle traffic along Station Street, coupled with a less permeable rail and road corridor access for pedestrian access, will result in less frequenting to the Chelsea Retail and Activity Hub.

Land contamination and spoil management

LXRA submitted that it has undertaken with concept design, a significant amount of site investigation to form a suitable view of land contamination risk for the Project(s) (encompassing soil, groundwater and soil vapour). They indicated:

- Due to the ground conditions and associated historical land use, that contamination will be encountered by construction
- EPRs: CL1 to CL4 should provide for sufficient identification and management of these contamination risks during construction and further into operation.

EPA Victoria (Submission 207) flagged risks posed by construction of the Project(s) from disturbance of potential ASS and the likelihood of encountering some amounts of contaminated soil and groundwater at the project(s). EPA Victoria:

- requested a Spoil Management Plan (EPR CL1) be prepared in close consultation with EPA Victoria
- requested an ASS Management Plan (EPR CL2) be prepared with early consultation with EPA Victoria
- for EPR CL3 (Waste Management) all Projects construction wastes, if removed from the Project Areas must meet the requirements of IWRG (2009), and related EPA Victoria guidance
- in association with EPR CL4 (Acidic and/or Contaminated Groundwater (Construction)), recommended that further site–specific data be collected on potential soil and groundwater contamination, to better inform risk assessment and development of mitigation measures, where relevant EPA Victoria guidance was to be followed
- noted that EPR CL5 (Groundwater Quality Mitigation Plan), covers management of potential changes to groundwater quality from the Projects. EPA Victoria requested the ability to review and provide feedback on this plan
- in relation to EPR GW1 (Rail Trench Design) and EPR GW2 (Groundwater Performance Outcomes), expected a detailed plan of how these are to be achieved and for it to be provided to EPA Victoria for review and comment
- noted for EPR GW3 (Groundwater Monitoring Plan), that this would need developing with EPA Victoria review and agreement, where they understood that further groundwater investigations and modelling predictions are to feed into the development of this plan
- under EPRs GW4 and GW5, recommended the appointment of an Independent Reviewer, to review the development of the Projects and finalisation of associated mitigation measures, and to provide advice on risks and compliance, with overseeing of plan implementation for various plans.

Council requested:

- Council be consulted with the development of the Spoil Management Plan, to identify local high–priority sites to receive any 'clean fill' ('Fill Material' as described by IWRG) from Project(s) spoil. Council argued that priority should be provided to those end-placement sites located closest to the Project(s) to minimise disturbance to the community along transport routes, as well as assisting in reducing carbon emissions from the project(s) construction. Council requested to work with LXRA, to explore potential for spoil disposal sites within the Kingston Green Wedge area.
- A further EPR be established, to require landowners to be notified of land contamination that is identified from the Project(s).

Mr Stuckey provided evidence for LXRA, that the level of investigation for the current project(s) development stage was appropriate, to form a suitable appraisal on the risks posed and EPRs required for risk management across construction and operation.

Mr Piper in his evidence for Council, noted that further work on land contamination investigation and risk appraisal and management would be required as part of detailed design.

Settlement

Mr Piper in evidence for Council, agreed that '*the majority of the settlement will occur within the Quaternary soft clays'*. Mr Piper offered that additional items which could contribute to ground settlement, including:

- Lateral movement of the piled retention and cut-off wall, resulting in both horizontal and vertical movement behind the wall (Mr Piper suggested the retention system be designed for the 'at–rest' condition, if possible, or that lateral movements behind the pile walls be reduced as far as practical)
- Groundwater drawdown can lead to densification of finer–grained sediments and subsequent settlement. Mr Piper offered that 'It is likely that this effect has occurred in the past and so only minor settlement would be expected from this effect'.

Mr Piper indicated that these types of issues could be suitably addressed across detailed design and that they would not prevent construction.

Water management

Mr Meyers from AECOM GHD JV provided evidence for LXRA across the surface water impact assessment.

EPA flagged risks posed by construction of the Projects from disturbance of ASS and the likelihood of encountering contaminated soil and groundwater with excavation.

Friends of Edithvale-Seaford Wetlands indicated the importance of long–term monitoring across the environmental factors related to groundwater and surface water quality changes by the Projects. They asked for a transparent reporting process across monitoring, with robust contingency plans in place to address unexpected issues.

Chelsea Bonbeach Train Station Group, Mr Chris Visser and Ms Jessie Lopez raised concerns about flooding in association with the rail trenches.

Submission 216 expressed concern over a possible change in groundwater quality for discharges into Port Phillip Bay and surface waters eventually discharging to the Bay, with impact on seagrass beds.

Mr James Walker Kingston Residents Association raised issues regarding acidification effects across surface waters and groundwater. This group stressed the importance of close monitoring across key water indicators and baseline monitoring, to more–thoroughly understand the risk implications of the Projects on the environment.

LXRA offered in their Submission C that:

- Contaminated water sourced from the trenches will be managed in accordance with EPR CL4 during construction. Post-construction, the as–built trenches will be suitably tanked (waterproofed) below the groundwater table, such that further inflow from surrounding groundwater will be prevented
- EPRs SW2 to SW4 specifically consider risk to discharged water quality.

13.5 Discussion

LXRA's Submission B – Table 2 sets out the general hierarchy of project environmental management and documentation. For the management of what is termed 'broad' impacts (across those as listed above), the following key management plans are proposed:

- Construction Environmental Management Plan
- Community and Stakeholder Engagement Management Plans
- Construction Noise and Vibration Management Plan.

All these plans are to be prepared and implemented, following, or concurrent with design. The IAC considers this as an appropriate approach, consistent with standard construction industry practice for major projects.

Regarding the monitoring and management of surface water or produced water impacts from the project's, various mitigation plans are proposed via the EPRs:

- GDE Monitoring and Mitigation Plan (Foreshore Native Vegetation): from EPR FF7
- GDE Monitoring and Mitigation Plan (Edithvale-Seaford Wetlands): from EPR FF8
- Groundwater Quality Plan: from EPR CL5.

LXRA suggested that during construction, ASS, contaminated soil and contaminated waters that are encountered can be suitably managed, that these risks are well understood, where adverse impacts may be avoided through the application of EPR's CL1 to CL5, and the already established regulatory framework for management of contaminated materials.

LXRA also suggested that changes to the groundwater regime through construction have the potential to result in the mobilisation of contamination. These risks can be minimised through use of EPR's GW1 to GW5 and EPRs CL1 to CL5 (CL1 to CL5 address the management of excavated spoil and its effects from trench construction).

Those EPRs linked to more typical 'as–expected' risk issues for the construction of this style of project in the urban environment include:

- Noise and vibration risk addressed by EPRs NV1 to NV3
- Dust and air quality addressed by EPRs AQ1 to AQ2
- Traffic is addressed through EPRs T1 to T8
- Business risk is addressed by EPR B1

- Settlement effects are addressed by EPR GM1 and GM2.

The IAC observes that a further level of peer review across certain, more critical monitoring and mitigation plans for construction is proposed by LXRA, as indicated within the EPRs. The review will be typically conducted by a suitably qualified, independent expert for that discipline.

Vibration / Settlement / Subsidence

EPR GW2 requires the Projects to be designed and operated such that changes to groundwater do not result in damage caused to buildings, sub-surface structures and other assets from aquifer depressurisation and associated subsidence.

EPR GM1 calls up the requirement for pre–construction baseline conditions survey on assets that may be impacted from vibration, subsidence or ground movement resulting from the Project(s). EPR GM2 relates to instigating repairs to those assets which are damaged from vibration, subsidence or ground movement as result of the Projects.

Traffic

LXRA have indicated that under EPRs T1 and T2, locations of public transport bus stops will be determined in consultation with PTV and the relevant road management authorities.

Land contamination and spoil management

Regarding Council's request (S226), LXRA suggested that it was not necessary, or appropriate to form an additional EPR requiring landowners to be notified of identified land contamination. This was because under EPR CL5, there was already a requirement to implement the Groundwater Quality Mitigation Plan in consultation with affected land managers.

EPR CL4 sets the requirement for baseline groundwater quality assessment work to be undertaken to better inform the risk assessment and management process.

LXRA offered that through EPR GW4, independent peer review would be conducted of both the Project(s) design and the Groundwater Management and Monitoring Plan.

EPR CL1 calls up the requirement for a Spoil Management Plan to be developed and implemented. LXRA have indicated that EPA Victoria will be consulted for the preparation of the Spoil Management Plan (covered under EPR EMF 2).

Frequent monitoring, re-modelling, expert review and adjustment measures are expected to be required through detailed design and construction. The involvement of the expert peer reviewer will form an important part of this process.

Further, more detailed groundwater investigations around the impact of dissolved chemical contaminant group (Perfluoroalkyl Sulfonate or PFAS) for the Edithvale Project are required, to discern most probably sources and to delineate and understand the migration of this dissolved chemical impact through the shallow aquifers.

EPA Victoria must be closely consulted with on the end-fate of any PFAS–impacted soil from the Projects and suitable on–site treatment options or off–site disposal options.

Early planning with the relevant sewer authority (South East Water) is also actively encouraged, when considering any option of the long-term permitted disposal of

contaminated waters from the project(s), to an external sewer drainage system under a Trade Waste Agreement.

Water

It is expected that construction risks associated with water can be suitably managed through the application of EPA Victoria (1996) Publication 480.

EPR SW1 relates to general stormwater management across construction. It requires:

- Deployment of best-practice sedimentation and pollution control measures set out within EPA Victoria (1996) Publication 480. Key controls would be established through the development and implementation of the Construction Environmental Management Plans and other interfacing plans
- Compliance with SEPP – WoV, when implementing a water collection and treatment system for discharge of treated water to other surface waters or drainage systems.

EPR SW3 relates to protecting the adjacent drainage networks across construction. It requires design of the surface water discharges from the Project(s), to pose no adverse impact to the adjacent drainage networks, through consultation with Council and Melbourne Water.

EPR SW5 relates to flood protection across construction. It requires existing levels of protection associated with overland flow paths to be maintained (considering flood levels, flows and velocities), where Council and Melbourne Water must be both consulted with, to establish compliance.

13.6 Findings

The IAC generally accepts the findings of the EES in relation to construction impacts and agrees that impacts can be effectively managed through well-established practices. In summary, the EPRs relating to construction impacts are considered satisfactory, and the IAC makes no recommendations for changes.

The IAC makes the following more specific findings in relation to construction impacts:

Noise and vibration

- **Construction noise and vibration is expected to impact upon sensitive uses. Major activities, such as piling, have the highest potential to cause both noise and vibration impact. Piling methods which avoid unnecessary vibration (that is, pile driving or vibro-piles) should be avoided, and the use of bored piling or continuous flight auger piling should be encouraged.**
- **Construction noise and vibration effects across the construction phase can be suitably monitored and managed through:**
  - **The EPRs**
  - **Careful scheduling of those works which are expected to cause higher disturbance levels**
  - **Use of construction methods that limit both noise and vibration effects**
  - **Monitoring across noise and vibration**
  - **Community consultation.**

Dust and air quality

- **The EPRs call-up measures for the control of dust generation to meet acceptable regulatory standards. Through these combined control measures, impacts from dust, combustion and odour to human health, amenity and the environment can be suitably managed, where the current residual risk rating is estimated as negligible.**

Traffic

- **The most pronounced traffic disruptions will occur during piling and the Main Occupation periods (with closures on Nepean Highway, Station Street, Edithvale Road and Bondi Road). At the time of Main Occupation, construction traffic to and from the site will also be at its highest level.**
- **Good design of: the works, construction methodologies, varying combinations of closures, changes to intersection signalling, and construction traffic routing, will assist in mitigating such impacts, where careful consideration of cumulative impacts need to be accounted for.**
- **The range of monitoring, planning and mitigation management measures as described within the EPRs are considered appropriate.**

Business

- **The key risk is in association with the vehicle and pedestrian access to Business Precincts across construction, where assuming the proposed EPRs are deployed, the risk was rated as 'minor'.**
- **Through the preparation and implementation of EPR 1 (Business Disruption Plan) and close consultation with local businesses, such impacts can be minimised, where LXRA have extensive experience to deliver the Projects resulting in minimal negative impact to traders.**

Land contamination and spoil management

- **The proposed EPRs that deal with contamination aspects are considered satisfactory.**

Settlement

- **Impacts from the Projects can be suitably managed and mitigated through the EPRs GM1 and GM2.**

Water management

- **Construction risks for the Project(s) can be suitably managed through EPRs SW1, SW3 and SW5.**

14 Environmental Management Framework

14.1 Background

The Environmental Management Framework (EMF) is discussed at Chapter 9 of the EES.

The EMF responds to the Scoping Requirements which state:

> *The EMF should describe the baseline environmental conditions to allow evaluation of the residual environmental effects of the project, as well as the efficacy of applied environmental management and contingency measures. The framework should include:*
> - *an environmental management system, with organisational responsibilities, accountabilities and governance arrangements;*
> - *an environmental risk register that is maintained during project implementation; and*
> - *environmental management measures proposed in the EES to address specific issues, including commitments to mitigate adverse effects and enhance environmental outcomes.*
>
> *The EMF should outline the environmental management plans for construction and operation phases of the project as well as the process and timing for development of these plans. The entity responsible for approval of the plans should be identified.*
>
> *…*
>
> *Project environmental performance requirements that define project-wide environmental outcomes to be achieved should be clearly described in the EMF.*

The key elements of the EMF are as follows:

- The EPRs
- Urban Design Guidelines
- Construction Environmental Management Plan
- Community and Stakeholder Engagement Management Plan
- Construction Noise and Vibration Management Plan
- Cultural Heritage Management Plan
- Acid Sulfate Soil Management Plan
- Spoil Management Plan
- Transport Management Plan.

Other plans required by the EPRs (as exhibited) include:

- Groundwater Management and Monitoring Plan (EPR GW3)
- Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Foreshore Native Vegetation) (EPR FF7)
- Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Edithvale-Seaford Wetlands) (EPR FF8)
- Groundwater Quality Plan (EPR CL5).

The bulk of the evidence and submissions received by the IAC related to the EPRs rather than the Urban Design Guidelines and other management plans that are yet to be developed. The EPRs provide performance based requirements that guide the preparation of the other elements of the EMF. The IAC has therefore concentrated its assessment and recommendations on the content of the EPRs, and makes no specific comments about the other documents that are subsequently required by the EPRs.

The Incorporated Documents require the Projects to be constructed and operated in accordance with the EPRs approved by the Minister for Planning.

14.2 EPRs

(i) Introduction

The EES sets out EPRs covering a range of responses to risks identified in the EES.

Many EPRs require consultation to be undertaken with relevant stakeholders. Where the EPRs necessitate the involvement of a 'relevant authority', this is defined as the relevant responsible authority for the requirement specified.

The EPRs are performance based and generally require the preparation of a plan or design that meets certain outcomes. The EPRs do not typically mandate or require a particular mitigation or management solution.

LXRA provided amended EPRs to the IAC (Version 3, 15 June 2018) that it submitted had been amended to respond to matters raised in submissions. The IAC has used that version as the basis for its assessment, and the changes proposed by LXRA in that version are accepted unless otherwise recommended by the IAC.

(ii) Summary of IAC assessment of EPRs

The IACs assessment of the EPRs is summarised as follows:

- Chapters 6, 7 and 8 address issues relating to the groundwater EPRs and recommends changes to EPRs GW1, GW2, GW3, GW4 and GW5.
- Chapter 9 addresses issues relating to surface water and recommends no changes to the surface water EPRs.
- Chapter 10 deals with impacts on the wetlands and recommends changes to EPR FF8.
- Chapter 11 addresses the impacts of foreshore vegetation and recommends changes to EPRs FF7 and FF9.
- Chapter 12 deals with other social and environmental effects and makes recommendations on EPRs AH1 and UD1.
- Chapter 13 examines the EPRs relating to construction impacts and concludes that the relevant EPRs are satisfactory.

(iii) Findings

The IAC makes the following findings in relation to the proposed EPRs:

- **The use of EPRs as the primary means of setting the framework for avoiding, monitoring and mitigating environmental risks associated with the Projects is supported.**
- **The IAC's preferred version of the EPRs is shown in Appendix E.**

14.3 Recommendation

The IAC makes the following recommendation in relation to the proposed EPRs:

1. **Adopt the IAC preferred version of the Environmental Performance Requirements as shown in Appendix E.**

15 Integrated assessment

This Chapter summarises the findings of the IAC and its response to the IAC Terms of Reference.

15.1 EES evaluation objectives

The following table summarises the IAC's assessment against each of the Evaluation Objectives in the EES.

Table 3 IAC assessment against EES evaluation objectives

Evaluation objective		Inquiry's integrated assessment	Report ref
Groundwater	To minimize effects on the regional groundwater regime and quality, particularly as they might impact on the hydrology of the Edithvale-Seaford Wetlands and elsewhere on other beneficial users.	The rail trenches will interrupt groundwater flows, as they extend to depths that intercept the regional aquifers. The Edithvale and Bonbeach Projects are both expected to cause groundwater mounding on the eastern (landward) side of the Project Area and groundwater drawdown on the western (coastal) side of the Project Area. In the absence of mitigation, the Edithvale Project has the potential to significantly impact on groundwater flows. It would be expected to exacerbate existing waterlogging at ground level to the east of the Project Area and cause minor changes to the hydrology of the Edithvale Wetlands. There are no standard engineering solutions for addressing the impact of the rail trench on groundwater flow, but feasible engineering measures have been identified by LXRA for the Edithvale Project. The application of the groundwater EPRs will reduce the impacts of the Edithvale Project on groundwater flows and reduce consequential effects associated with changes to the groundwater regime. Ongoing maintenance of the engineering mitigation works at Edithvale will be necessary to ensure that groundwater flows are not significantly impacted. The Bonbeach Project is expected to have lesser impacts on groundwater flows than the Edithvale Project, based on the inferred direction of groundwater flow and the location of the pile walls. Engineering measures for mitigation of impacts on groundwater flow have not been proposed by LXRA for the Bonbeach Project. Groundwater drawdown on the western side of the Bonbeach rail trench has implications for reduced water availability in wells and bores, and reduced access to groundwater for coastal vegetation along the Bonbeach Foreshore.	Chapter 6, 7, 8
Biodiversity	To avoid, minimize and/or offset adverse effects on native vegetation, listed threatened species and ecological communities, listed migratory species, the Ramsar listed Edithvale-Seaford Wetlands, other protected flora and	The existing vegetation in the Project Areas needs to be removed to enable the construction of the rail trenches. It consists of long linear patches of native and planted vegetation that includes species listed under the FFG Act and ecological communities of bioregional conservation significance. The loss of vegetation in the Project Areas is unavoidable and is proposed to be managed by offsets. The Project Areas are situated in the vicinity of the Edithvale Wetlands and Wannarkladdin Wetlands, which are remnants of the former Carrum Swamp. The Wetlands support native vegetation, listed threatened species of state and national significance, ecological communities of bioregional conservation significance,	Chapters 10, 11

	fauna and groundwater dependent ecosystems.	and listed migratory bird species. The Edithvale Wetlands are part of the Ramsar-listed Edithvale Seaford Wetlands. The Project Areas are situated over 1 kilometre from the Wetlands. On this basis, the Projects are not expected to have direct impacts on the Wetlands or species utilising the Wetlands for habitat. The Project areas are hydrologically connected to the Edithvale and Wannarkladdin Wetlands via surface water and groundwater, therefore, the Projects could potentially affect the Wetlands via changes in hydrologic regime and/or water quality. LXRA proposes to incorporate engineering mitigation measures in the Edithvale Project design and operations to address the interruption of groundwater flows, so that there should be minimal impact on the hydrology of the Edithvale Wetlands. Groundwater mounding associated with the Bonbeach Project is not expected to extend as far as the Wannarkladdin Wetlands. With these measures and application of the EPRs proposed in Appendix E, the risk of adverse impacts on the Wetlands is low. The foreshore vegetation to the west of the Project Areas has been identified as a groundwater-dependent ecosystem. Risks of adverse impact to the foreshore vegetation at Edithvale resulting from changes to the groundwater regime caused by the Edithvale Project will be mitigated through the incorporation of engineering mitigation measures and implementation of EPRs GW1 – 5. There is a risk of adverse impacts to foreshore vegetation arising from groundwater drawdown due to the Bonbeach Project. This risk is proposed to be mitigated through works to improve the resilience of the foreshore vegetation as set out in EPR FF9. EPRs FF7 and FF8 a provide for monitoring and mitigation to address uncertainties in the Environmental Impact Assessment and the residual risk of impacts to the Edithvale Wetlands, Wannarkladdin Wetlands, and foreshore vegetation at Bonbeach.	
Acid sulfate soils and contamination	To prevent adverse environmental or health effects from disturbing, storing or influencing the transport/movement or contaminated or acid-forming material.	It is likely that, during the excavation of the rail trenches, contaminated soil, contaminated groundwater, acid sulfate soils and some acidified groundwater will be encountered. The risk associated with these are generally well understood, where adverse impacts can be avoided through the application of EPRs CL1 – 5 and the established regulatory framework for the management of contaminated materials. Changes to the groundwater regime associated with the Projects has the potential to result in the mobilisation of contamination and acidification to the sub-surface. This risk can be minimised, through the application EPRs GW1 – 5 and CL1 – 5. Any changes to groundwater quality associated with contamination are likely to be temporary, localised and reversible.	Chapter 7

15.2 Overall assessment findings

The IAC makes the following overall comments on the environmental impacts of the Projects. These comments are designed to respond directly to the requirements set out in the Terms of Reference.

Findings on the significance of environmental effects of the level crossing removals proposed in the EES:

The likely risks of the Projects on groundwater and surface water are dealt with in detail in Chapters 6, 7, 8 and 9 and the findings are as summarised in the Table 3 above.

The IACs findings on the impacts on wetlands and foreshore vegetation are set out in Chapters 10 and 11.

In summary the environmental effect of the Projects are expected to be acceptable s if constructed and operated in accordance with the EMF.

In addition to the findings set out above in relation to groundwater, biodiversity and acid sulfate soils, the IAC assessed other social and environmental impacts of the Projects, both during and after construction. The IAC has concluded that the EPRs properly and comprehensively deal with the risks associated with the Projects. The IAC has recommended only minor changes to the EPRs on these other items.

Matters of national environmental significance under the EPBC Act:

Matters of national environmental significance are summarised in Chapter 17.

With properly designed engineering mitigation measures at the Edithvale Project and application of all relevant EPRs, the Projects are not expected to have unacceptable impacts on the Edithvale Seaford Ramsar Wetland site. The Projects are not expected to have unacceptable impacts on threatened flora and fauna species nor migratory birds via changes in the ecological character of Edithvale Wetlands and Wannarkladdin Wetlands.

The impacts from light spill, noise, vibration and dust are primarily associated with construction, and are not expected to extend to the Edithvale Wetlands, which are over 1 kilometre from the Project Areas. The EPRs require a range of measures to mitigate risks associated with construction.

Conclusions on the feasibility of the project achieving acceptable environmental outcomes:

The IAC has considered the applicable legislation and related policy, and has been provided with submissions and evidence on relevant best practice. The EES and associated Technical Reports, appropriately modified by peer review and the expert evidence and submissions provided through the EES process, provide a comprehensive risk-based analysis and response.

The IAC finds that the Projects are feasible and the environmental outcomes are manageable subject to the EMF being implemented, including the monitoring and mitigation plans as set out in the EPRs.

Recommendations on whether the proposed project will deliver an appropriate balance of environmental, economic and social outcomes:

Having regard to the evaluation objectives in the EES scoping requirements, public submissions and the lAC's conclusions on the significant effects of the project; the IAC finds that the Projects will deliver an appropriate balance of environmental, economic and social outcomes subject to the EMF being implemented, including the monitoring and mitigation plans as set out in the EPRs.

Recommendations for feasible modifications to the project:

The EMF and EPRs set out in detail specific measures to prevent, mitigate or compensate for significant adverse effects of the Projects.

The IAC has recommended changes to the EPRs that include requirements for more extensive monitoring and mitigation plans for the Edithvale and Wannarkladdin wetlands and the Bonbeach and Edithvale foreshore vegetation.

The EPRs as modified properly and comprehensively deal with the risks associated with the Projects.

Recommendations for approval conditions:

The Projects require the following approvals under Victorian legislation:

- an amendment to the Kingston Planning Scheme under the *Planning and Environment Act 1987* for each project
- a Cultural Heritage Management Plan (CHMP) under the *Aboriginal Heritage Act 2006*.

Other approvals required for the Projects under Victorian legislation may be required, depending on the final design. Relevant approvals likely to be required include:

- a permit to take protected flora under the *Flora and Fauna Guarantee Act 1995*
- a consent for works within a road reserve under the *Road Management Act 2004*
- a licence to use groundwater and/or a permit for works on waterways under the *Water Act 1989*
- a management authorisation to remove any wildlife under the *Wildlife Act 1975*
- consent under the *Coastal Management Act 1995*.

The IAC recommends that the Projects be approved provided they are constructed and operated in accordance with the approved EMF and EPRs.

Recommendations on the framework for environmental management including the proposed environmental performance requirements for the project:

The proposed EMF approach is supported. The framework proposed has been used successfully for other large, complex projects in Victoria and is appropriate to apply for the Edithvale and Bonbeach rail level crossing projects.

The IAC's findings on the proposed EPRs are summarised in section 14.2, and discussed in detail in Chapter 6 to 13 of this report. The EPRs are supported subject to the changes recommended in Appendix E.

15.3 Index to Terms of Reference report requirements

The following table is an index to the IACs response to the terms of reference paragraph 21 report requirements.

Terms of reference requirement	IAC response and findings	Report Chapter
a. findings on the significant of environmental effects (impacts) of the level crossing removals proposed in the EES, including impacts on matters of national environmental significance protected under relevant controlling provisions of the EPBC Act	The likely risks of the project on groundwater and surface water are dealt with in detail in Chapters 6, 7, 8, 9. The IACs findings on the impacts on wetlands and foreshore vegetation are set out in Chapters 10 and 11. An integrated assessment is provided in Section 15.2 above Matters of national environmental significance are summarised in Chapter 17	6, 7, 8, 9 10, 11 15 10, 17
b. conclusions on the feasibility of the project achieving acceptable environmental outcomes in the context of applicable legislation, related policy, relevant best practice, and the principles and objectives of ecologically sustainable development	The IAC finds that the Projects are feasible and the environmental outcomes are acceptable and manageable, subject to the Environmental Management Framework being implemented, including the monitoring and mitigation plans as set out in the EPRs.	15
c. recommendations on whether the proposed project will deliver an appropriate balance of environmental, economic and social outcomes, having regard to the evaluation objectives in the EES scoping requirements, public submissions and the IAC's conclusions on the significant effects of the project	The IAC finds that the Projects will deliver an appropriate balance of environmental, economic and social outcomes subject to the Environmental Management Framework being implemented, including the monitoring and mitigation plans as set out in the EPRs.	15
d. recommendations for feasible modifications to the project, including specific measures to prevent, mitigate or compensate for significant adverse effects in the context of relevant standards, objectives and guidelines established under relevant legislation	The IAC has recommended changes to the EPRs that include requirements for more extensive monitoring and mitigation plans for the Edithvale and Wannarkladdin wetlands and the Bonbeach and Edithvale foreshore vegetation.	10, 11
e. recommendations for approval conditions under Victorian law necessary to achieve acceptable environmental outcomes in the context of applicable legislation and policy, including advice on the PSA for the project	The IAC recommends that the Projects be approved to proceed subject to them being constructed and operated in accordance with the approved EMF and EPRs.	14, 16
f. recommendations on the framework for environmental management including the proposed environmental performance requirements for the project	The proposed EMF approach is supported. The EPRs are supported subject to the changes recommended in Appendix E.	14 App E

Terms of reference requirement	IAC response and findings	Report Chapter
g. recommendations for the statutory planning framework established for the project	The planning framework provides approval for the Projects though the Incorporated Documents, which in turn are conditional on compliance with the EPRs. This approach is supported.	14, 16
h. recommendations for proposed amendments to the Kingston Planning Scheme under the P&E Act to facilitate the project	The proposed Incorporated Documents are supported subject to the changes shown in Appendix F	16 App F
i. relevant information and analysis in support of the IAC's conclusions and recommendations	The main body of the IAC's assessment is contained in Chapters 6 to 13.	6 to 13
j. a description of the proceedings conducted by the IAC and a list of those consulted and heard by the IAC	Chapter 1 provides a summary of the Inquiry proceedings and submissions received.	1
k. a list of all recommendations including cross references to relevant discussions in the report	The main recommendations of the IAC are contained in the changes proposed to the EPRs and the Incorporated Documents set out in Appendices E and F respectively.	App E App F

PART C: APPROVALS AND MATTERS OF COMMONWEALTH INTEREST

16 Planning Scheme Amendments

16.1 The Incorporated Documents

Draft Kingston Planning Scheme Amendments C155 Edithvale and C156 Bonbeach were exhibited with the EES. The Amendments introduce Incorporated Documents that provide the necessary planning approvals under the *Planning and Environment Act 1987* for the Projects, provided that the Projects are constructed and operated in accordance with the EPRs approved by the Minister for Planning.

LXRA tabled revised versions of the Incorporated Documents at the Hearing (Documents 4 and 5). LXRA submitted that the revisions to the Incorporated Documents were minor, "*tidying up the wording and clarifying the reference to the EMF and EPRs*".

16.2 Submissions

Council supported the use of Incorporated Documents to grant overall planning approval for the Projects, and exempt the need for other planning approvals. Council noted[241]:

> *The use of Incorporated Documents for major projects, in particular, has become relatively common. The approach provides project certainty, substantial timing benefits for project delivery and subject to its proper drafting and implementation, is a beneficial and appropriate planning tool.*

Council raised questions about the expiry date of the Incorporated Documents. It pointed out that monitoring and mitigation obligations may well extend beyond the 1 December 2025 expiry date.

Council also sought and additional clause in the Incorporated Documents to provide Council with a greater level of control over the design of drainage assets:[242]

> *The Council seeks in the Incorporated Documents new sub-clauses to clauses 4.2.11 (Edithvale) and 4.2.10 (Bonbeach) as follows:*
>
> *<u>Drainage</u>*
>
> *Drainage must be provided to the development:*
>
> *(a) through a design; and*
>
> *(b) onsite retention and treatment capacity, local infrastructure connections and financial contributions to outfall treatment, re-use and discharge;*
>
> *to the satisfaction of the Kingston City Council.*

Council submitted that surface water and local drainage was an important issue for the Projects, and Council should have a say in how its assets are affected.

Council also submitted a suggested change to Clause 4.2.1, but withdrew this request.

LXRA did not oppose an extension of the expiry date to align with the proposed monitoring programs.

241 Council Hearing submission, Document 22, p2

242 Council Hearing submission, Document 22, p8

LXRA opposed the addition of a clause to refer to drainage in the Incorporated Documents. It submitted that EPRs SW3 and SW4 adequately address surface water discharge and quality, and require the design to be prepared in consultation with Council and Melbourne Water.

16.3 Discussion

The IAC agrees that the Incorporated Documents are an appropriate means to grant planning approval for the Projects, and provide appropriate exemptions for other planning approvals during the course of the Projects.

The IAC notes that the approvals (and further exemptions) contain conditions relating to:

- Compliance with the EMF (including the EPRs)
- Native vegetation
- Heritage management
- Road access, and
- Other conditions.

The Projects approvals are therefore inextricably linked to the EMF and EPRs. The EPRs in turn set out the performance-based requirements that must be complied with. The IAC agrees that this is the most appropriate approach, and any details of the outcomes sought or who should be consulted should be set out in the EPRs rather than the Incorporated Documents.

An EMF is a common approach to managing the environmental impacts of large projects, and has been employed for a number of other major projects in recent years.

Both Incorporated Documents include the following Expiry clause:

> *The controls in this document expire if any of the following circumstances apply:*
>
> - *The development allowed by the controls, including preparatory works, is not started by 1 December 2020.*
> - *The development allowed by the controls is not completed by 1 December 2025.*
>
> *The Minister for Planning may extend these periods if a request is made in writing before the expiry date or within three months afterwards.*

As "*the development*" (arguably) includes the monitoring and mitigation actions set out in the EPRs, the IAC agrees that there is merit in extending the expiry date for the Incorporated Documents to align with proposed monitoring programs. The IAC has recommended monitoring of the potential groundwater impacts on the wetlands and foreshore vegetation for a period of at least ten years after construction. The IAC therefore recommends that the second dot point in the Expiry clause be altered to read:

- *The development allowed by the controls is not completed by 1 December ~~2025~~2030.*

The IAC agrees with LXRA that the drainage clause proposed by Council for inclusion in the Incorporated Documents is not necessary. The IAC agrees that EPRs SW3 and SW4 adequately address surface water discharge and quality, and require appropriate consultation with Council and Melbourne Water.

16.4 Findings

The IAC makes the following findings in relation to the proposed Incorporated Documents:

- The revised versions of the Incorporated Documents as tabled by LXRA at the Hearing are appropriate and should be adopted subject to extending the expiry date to 1 December 2030.
- The IAC's preferred version of the Incorporated Documents is shown in Appendix F

16.5 Recommendation

The IAC makes the following recommendation in relation to the proposed Incorporated Documents:

2. **Adopt the IAC preferred version of the Incorporated Documents as shown in Appendix F.**

17 Matters of Commonwealth interest

17.1 The issue

The Projects were referred to the Australian Government under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The delegate for the Minister for the Environment and Energy determined on 8 May 2017 that the project is a 'controlled action' and hence requires assessment and approval under the EPBC Act. The provisions for the Australian Government's controlled action decision under the EPBC Act are:

- Ramsar wetlands (sections 16 and 17B)
- Listed threatened species and ecological communities (sections 18 and 18A)
- Listed migratory species (sections 20 and 20A).

The EES process is accredited to assess impacts on matters of national environmental significance under the EPBC Act through the Bilateral (Assessment) Agreement between the Commonwealth and the State of Victoria – refer to Schedule 1 (part 5) of the bilateral agreement. Note that what are generally termed 'effects' in the EES process correspond to 'impacts' under the EPBC Act. The EES for the project will be undertaken in accordance with the bilateral agreement; there will be no separate assessment by the Commonwealth. This helps avoid process duplication and enable alignment of mitigation and requirements under the relevant state and commonwealth legislation.

The Commonwealth Minister or delegate will receive the Minister for Planning's assessment under the EE Act at the conclusion of the EES process and use it as the basis for deciding on the approval of the project under the EPBC Act.

17.2 EES documentation

The EES provided an assessment of the implications of the Projects for Matters of National Environmental Significance (MNES) in Attachment III.

17.2.1 Matters of National Environmental Significance (MNES)

The EES identified three MNES that are potentially at risk from the project:

- The Edithvale Seaford Wetlands Ramsar Site
- Threatened species listed under the EPBC Act
- Migratory species listed under the EPBC Act.

(i) Ramsar Wetland

The Edithvale Wetlands, part of the Edithvale Seaford Wetlands Ramsar Site, are situated approximately 1.3 kilometres east of the Edithvale project area and approximately 2 kilometres north-east of the Bonbeach project area. The wetlands are hydrologically linked to the Project areas via groundwater and surface flows.

The Seaford Wetland is further away from the Project areas and is not connected by surface water or groundwater to the Project areas. On this basis, the EES determined that it is not at risk of impact from the Projects.

(ii) Threatened Species

The EES found that two flora species and five fauna species listed as threatened under the EPBC Act have at least a moderate likelihood of occurring within the GDE study area (Figure 10):

- River Swamp Wallaby-grass
- Swamp Everlasting
- Australasian Bittern
- Curlew Sandpiper (also listed as migratory under the EPBC Act)
- Bar-tailed Godwit (two subspecies) (also listed as migratory under the EPBC Act)
- Australian Painted Snipe
- Grey-headed Flying-fox.

All of these species are associated primarily with the Edithvale and Wannarkladdin Wetlands, except for the Grey-headed Flying-fox, which forages across suburban Melbourne.

(iii) Listed Migratory Species

A total of 20 migratory bird species listed under the EPBC Act were assessed as having moderate likelihood of occurrence within the GDE study area.

The migratory species considered to make the most significant use of local habitats are the Sharp-tailed sandpiper and Latham's Snipe. Other migratory species include waders such as egrets, aerial species such as the fork-tailed swift, and less common shorebird species such as the Common Sandpiper and Curlew Sandpiper. Key habitats within the GDE study area for the migratory birds include Edithvale wetlands and Wannarkladdin Wetlands. Other areas may be used opportunistically by these species but are not considered to be significant or important habitat for the migratory species. The migratory species are not associated with the Project areas.

17.2.2 Implications of the Projects for MNES

The EES concluded that significant impact on MNES is unlikely based on [243]:

- The absence of suitable habitat for threatened and/or migratory species within and immediately adjacent to the Project areas.
- The distance between the project areas and high value GDEs which are known to support threatened and/or migratory species. The Edithvale and Wannarkladdin Wetlands are situated over one kilometre from the Project areas and the EES determined that they are beyond the area of influence for direct disturbances associated with the Projects.
- No impact on groundwater levels at the Edithvale Wetland or Wannarkladdin Wetlands is shown by the groundwater modelling.

17.3 Submissions and evidence

Expert evidence relating to matters of Commonwealth Interest was presented by Mr Cameron Miller of AECOM GHD JV and Mr Lance Lloyd (expert witness called by Council).

Mr Miller's evidence confirmed the assessment presented in the EES. He concluded that:

[243] EES p. III.36

> *It is unlikely that works undertaken within the project areas will have a significant impact on MNES*[244]*.*

Mr Lloyd indicated that the scope of his evidence was limited to:

> *… the wetland and Ramsar values of the Ramsar listed Edithvale-Seaford Wetlands ("Wetlands") and not any other sites affected by the works*[245]

Mr Lloyd's evidence assumed that there would be no alteration to the groundwater regime of the wetlands, which he noted "*relies on the robustness and accuracy of the modelling*"[246]. He concluded that:

> *With no alteration to the groundwater regime, the closely connected surface water regime will show no effects and therefore there will be no impacts on the ecological character of the Wetlands. Logically, with no impact upon ecological character, then there will be no impact upon the Ramsar listing criteria for the site*[247]*.*

17.4 Discussion and findings

Table 4 summarises the IAC's findings in relation to potential risks to Matters of National Environmental Significance.

244 Mr Miller, Expert Witness Report, p. 8
245 Mr Lloyd Expert Witness Statement, p 2
246 Mr Lloyd Expert Witness Statement, p 2
247 Mr Lloyd Expert Witness Statement, p 7

Table 4 Findings in Relation to Potential Risks to Matters of National Environmental Significance

Potential Risk	Implications for Ramsar Wetlands	Implications for Threatened Species	Implications for Migratory Species	Cross-Reference
Change in hydrology and/or water quality • Changes in groundwater levels and baseflows associated with groundwater mounding • Changes in groundwater quality, including salinity, acidity and contaminants • Changes in surface water quality.	With integrated engineering mitigation measures at the Edithvale Project and application of all relevant EPRs, the Projects are not expected to have impacts that exceed the Limits of Acceptable Change for the Edithvale Seaford Ramsar Wetland site. Ongoing maintenance of the engineering mitigation works at the Edithvale Project will be required to ensure this outcome. The EPRs provide for monitoring and mitigation of adverse impacts on the Edithvale Wetlands if they arise.	The Projects (with integrated engineering mitigation measures at the Edithvale Project and application of all relevant EPRs) are not expected to have significant impacts on threatened flora and fauna species via changes in the ecological character of Edithvale Wetlands and Wannarkladdin Wetlands. There are uncertainties in regard to the EES predictions. The EPRs provide for monitoring and mitigation of impacts on the ecological character of the wetlands if they arise.	The Projects (with integrated engineering mitigation measures at the Edithvale Project and application of all relevant EPRs) are not expected to have significant impacts on migratory bird species via changes in the ecological character of Edithvale Wetlands and Wannarkladdin Wetlands. There are uncertainties in regard to the EES predictions. The EPRs provide for monitoring and mitigation of impacts on the ecological character of the wetlands if they arise.	Edithvale and Wannarkladdin Wetlands: Chapter 10; EPR FF8 Groundwater levels: Chapter 6; EPRs GW1, GW2, GW3, GW4, GW5 Groundwater quality: Chapter 8; EPRs GW1, GW2, GW3, GW4, GW5 Acid Sulfate Soils: Chapter 7; EPRs CL2, CL4, CL5 Surface Water: Chapter 9; EPRs SW1, SW 2, SW 3, SW4
Light Spill	Light spill is not expected to extent to the Edithvale Wetlands, which are over 1 km from the Project Areas.	Minimal impact expected as the threatened species other than the Grey-headed flying fox are all associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas. The Grey-headed flying fox is forages across a wide range of suburban environments.	Minimal impact expected as the migratory species are primarily associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas.	Chapter 13; LV2, LV3

Potential Risk	Implications for Ramsar Wetlands	Implications for Threatened Species	Implications for Migratory Species	Cross-Reference
Noise and Vibration	Noise and vibration impacts are primarily associated with construction, and are not expected to extend to the Edithvale Wetlands, which are over 1 km from the Project Areas.	Minimal impact expected as the threatened species other than the Grey-headed flying fox are all associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas. The Grey-headed flying fox is forages across a wide range of suburban environments.	Minimal impact expected as the migratory species are primarily associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas.	EPRs NV1, NV2, NV3
Dust and Air Quality	Dust and air quality impacts are primarily associated with construction, and are not expected to extend to the Edithvale Wetlands, which are over 1 km from the Project Areas.	Minimal impact expected as the threatened species other than the Grey-headed flying fox are all associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas. The Grey-headed flying fox is forages across a wide range of suburban environments.	Minimal impact expected as the migratory species are primarily associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas.	Chapter 13; EPRs AQ1 AQ2
Other Risks Associated with Construction	No significant impacts are expected at the Edithvale Wetlands, which are over 1 km from the Project Areas.	Minimal impact expected as the threatened species other than the Grey-headed flying fox are all associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas. The Grey-headed flying fox is forages across a wide range of suburban environments.	Minimal impact expected as the migratory species are primarily associated with the Edithvale and Wannarkladdin Wetlands, which are over 1 km from the Project areas.	Chapter 13; EPRs CL1, CL2, CL3, FF3

Appendix A Inquiry and Advisory Committee Terms of Reference

Terms of Reference

Edithvale Bonbeach Level Crossing Removal Project – Inquiry and Advisory Committee

An inquiry appointed pursuant to section 9{1} of the *Environment Effects Act 1978* and advisory committee appointed pursuant to Part 7, Section 151 of the *Planning and Environment Act 1987* to consider and report on the Edithvale Bonbeach Level Crossing Removal Project, in accordance with these terms of reference.

Name

1. The combined inquiry and advisory committee is to be known as the Edithvale Bonbeach Level Crossing Removal Project Inquiry and Advisory Committee (IAC}.

Skills

2. The IAC is to include experience in:
    a. coastal acid sulphate soils and contaminated land/groundwater;
    b. ecology, especially Ramsar listed wetlands
    c. hydrogeology; and
    d. strategic and statutory planning.
3. The IAC may seek additional specialist expert advice if required.
4. The IAC will include an appointed, Chair and other members.

Background

Edithvale Bonbeach Level Crossing Removal (the project)

5. The project will remove the level crossings at Edithvale Road, Edithvale and Station StreetjBondi Road, **Bonbeach by grade separating the roads and the Frankston rail line. A rail-under-road option is** proposed for both level crossing removals. The existing stations will be demolished and replaced with new station infrastructure.
    a. The Bonbeach project area extends from Chelsea Road, Chelsea to Patterson River, Bonbeach. It includes the rail corridor and all of Station Street and Nepean Highway located to the east and west and small sections of adjacent road reserves.
    b. The Edithvale project area extends from Lincoln Parade, Aspendale to Chelsea Road, Chelsea. It includes the rail corridor and all of Station Street and Nepean Highway to the east and west and small sections of adjacent road reserves.
    c. The trench at Edithvale will be up to 1,300 metres long and a minimum of 14 metres wide, expanding to 24 metres wide at the platform location.
    d. The trench at Bonbeach will be up to 1,200 metres long and a minimum of 14 metres wide, expanding to 24 metres wide at the platform location.
    e. At both locations, the station precinct will include car parking on a deck over the rail trench. A barrier will protect the trench at both locations and ensure safety for the community at street level. At Edithvale,a new electrical substation, required to supply the increased power demand for trains on the Frankston corridor, will be built on the deck.

6. Construction will involve site-establishment works such as utility relocation and establishment of site facilities, followed by piling associated with the walls of the trench and lastly, the main occupation to excavate the trenches and construct the station and railway infrastructure.

7. The project proponent is the Level Crossing Removal Authority, an administrative office of the Department of Economic Development, Jobs, Transport and Resources.

EES decision

8. On 5 May 2017, the Minister for Planning determined that an environment effects statement (EES) was required for the project under the *Environment Effects Act 1978* (EE Act) and issued the decision with procedures and requirements for the preparation of the EES under section 88(5) of the EE Act. The reasons for decision were based on the potential for a range of significant environmental effects, particularly those on:

    a. the regional groundwater regime with potential subsequent changes to hydrological conditions at the Ramsar listed Edithvale-Seaford Wetlands;

    b. the ecological character and habitat values of the Edithvale-Seaford Wetlands, especially the critical components of habitat for listed waterbirds, and the wetlands' dependent flora and fauna, due to alterations in the groundwater regime; and

    c. the protected beneficial uses of groundwater, due to alterations in the groundwater regime, along with risks to human health, recreation and ecosystems due to changes in water quality from activation and excavation of potential acid sulphate soils and from interception/ movement of existing contaminated soil and groundwater.

9. The Minister's decision also noted that 'other potential effects on the social or environmental setting are unlikely to be significant and should be readily addressed and mitigated through existing statutory processes and requirements under the *Aboriginal Heritage Act 2006*, *Environment Protection Act 1970*, *Planning and Environment Act 1987* (P&E Act), including construction noise, traffic and transport impacts, as well as visual impacts'.

10. The Level Crossing Removal Authority prepared an EES in response to the Minister for Planning's decision and scoping requirements issued for the EES in September 2017.

11. The EES was placed on public exhibition, together with draft amendments to the Kingston Planning Scheme, from 19 March 2018 to 2 May 2018.

Commonwealth decision

12. The project was determined to be a controlled action that requires assessment and approval under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) on 8 May 2017, because of its potential impacts on particular matters of national environmental significance. The controlling provisions under the EPBC Act relate to Ramsar wetlands (sections 16 and 178), listed threatened species and communities (sections 18 and 18A) and listed migratory species (sections 20 and 20A).

13. The EES process is an accredited assessment process under the Commonwealth-Victorian Bilateral Agreement for Environmental Impact Assessment[1] to provide for the assessment of matters of national environmental significance required under the EPBC Act. The Minister for Planning's assessment under the EE Act will be provided to the Commonwealth to inform the EPBC Act approval decision, in accordance with Schedule 1Part B of the bilateral agreement.

[1]The agreement came into operation on 25 June 2009 and provides for the accreditation of specified Victorian statutory processes to ensure an integrated and coordinated assessment of actions requiring Commonwealth approval.

14. Based upon the material provided to the IAC, the IAC report should address impacts on matters of national environmental significance to inform the Minister for Planning's assessment, as set out in paragraph 12.

Planning approval process

15. The Level Crossing Removal Authority has prepared draft Planning Scheme Amendments (PSAs) for each of the proposed level crossing removals (Amendments C155 and C156 to the Kingston Planning Scheme), in accordance with the P&E Act.

16. The IAC is to provide advice on the draft PSAs. The draft PSAs will facilitate the use and development of the project in accordance with project incorporated documents in the Kingston Planning Scheme. The incorporated documents will include a requirement for a framework to manage environmental effects associated with both the construction and operational phases of the project.

Other approvals

17. Under Victorian law, the project requires other approvals and consents, as outlined in the EES:

    a. an approved cultural heritage management plan under the Aboriginal Heritage Act;

    b. permits to remove protected flora and/or fauna from public land under the *Flora and Fauna Guarantee Act 1988* (if required);

    c. permits to take wildlife under the *Wildlife Act 1975* (if required); and

    d. consent to use and develop coastal Crown land or land within 200 metres of the high-tide mark under the *Coastal Management Act 1995* (if required).

Purpose of the inquiry

18. In overview, the IAC is to:

    a. consider and report on the potential significant effects of the project investigated in the EES, taking into account the procedures and requirements of the Minister for the preparation of the EES under section 8B(S) of the EE Act (see Attachment 1) and the controlling provisions under the EPBC Act (see Attachment 2) as outlined in paragraph 12;

    b. recommend necessary avoidance, mitigation or management measures for the development of the project to balance project objectives with environmental, economic and social outcomes; and

    c. assess the adequacy of the proposed environmental performance requirements and their suitability to achieve project-wide environmental outcomes, as described in the scoping requirements.

19. The IAC is to provide an integrated assessment of the potential significant environmental effects of the project.

Purpose of the advisory committee

20. The IAC is to undertake the following.

    a. Review the draft PSAs along with public submissions received in relation to the planning controls proposed by the draft PSAs.

    b. Assess whether the planning controls proposed by the draft PSAs are appropriate to facilitate the use and development of the project.

Report

21. The IAC must produce a written report for the Minister for Planning presenting the IAC's:

a. findings on the significant of environmental effects (impacts) of the level crossing removals proposed in the EES, including impacts on matters of national environmental significance protected under relevant controlling provisions of the EPBC Act;

b. conclusions on the feasibility of the project achieving acceptable environmental outcomes in the context of applicable legislation, related policy, relevant best practice, and the principles and objectives of ecologically sustainable development;

c. recommendations on whether the proposed project will deliver an appropriate balance of environmental, economic and social outcomes, having regard to the evaluation objectives in the EES scoping requirements, public submissions and the IAC's conclusions on the significant effects of the project;

d. recommendations for feasible modifications to the project, including specific measures to prevent, mitigate or compensate for significant *adverse* effects in the context of relevant standards, objectives and guidelines established under relevant legislation;

e. recommendations for approval conditions under Victorian law necessary to achieve acceptable environmental outcomes in the context of applicable legislation and policy, including *advice* on the PSA for the project;

f. recommendations on the framework for environmental management including the proposed environmental performance requirements for the project;

g. recommendations for the statutory planning framework established for the project;

h. recommendations for proposed amendments to the Kingston Planning Scheme under the P&E Act to facilitate the project;

i. relevant information and analysis in support of the IAC's conclusions and recommendations;

j. a description of the proceedings conducted by the IAC and a list of those consulted and heard by the IAC; and

k. a list of all recommendations including cross references to relevant discussions in the report.

Task

22. The IAC may apply to *vary* these terms of reference in writing, prior to submission of its report.

23. The IAC may inform itself in any way it sees fit, but must consider all relevant matters, including but not limited to:

    a. the exhibited EES and draft PSAs;

    b. all public submissions and evidence provided by the proponent, state agencies, local council and the public;

    c. information provided by the proponent that addresses, to the extent practicable, the submissions provided by the public; and

    d. other information provided to, or obtained by, the IAC, having regard to statutory provisions, policies and plans.

24. The IAC must conduct a public hearing and may make other such enqumes as it considers are relevant to its assessment of the potential environmental effects of the project.

25. The IAC must conduct its hearings in accordance with the following principles:

    a. the hearings will be conducted in an open, orderly and equitable manner, in accordance with the rules of natural justice, with a minimum of formality and without the necessity for legal representation;

    b. the IAC process is to be exploratory and constructive with adversarial behaviour minimised;

c. **parties without legal representation will not be disadvantaged – cross-examination will be** discontinued where deemed inappropriate by the IAC Chair;and

d. the IAC may commission specialist advice on other matters, if required, particularly in the areas of groundwater, engineering and ecology.

26. The hearings are to be conducted in public, unless a submission is confidential in nature and the IAC Chair deems the hearing should be closed to the public in relation to that submission.

27. The IAC will meet and conduct hearings when there is a quorum of at least two of its members present.

28. The IAC will make an audio recording of any hearing sessions publicly available, as soon as practicable, after the conclusion of the sessions.

Submissions

29. All submissions are to be collected by Planning Panels Victoria in accordance with the Guide to Privacy at PPV. Electronic copies of submissions will be provided to the relevant Council, DELWP and Level Crossing Removal Authority.

30. Petitions and pro-forma letters will be treated as a single submission and only the first name to appear on the first page of the submission will receive correspondence in relation to the IAC.

31. The IAC must retain a library of all written submissions or other supporting documentation provided to it directly until either, a decision has been made on its report or,five years has passed from the time of its appointment.

32. Any written submissions or other supporting documentation provided to the IAC must be published on Planning Panels Victoria website, unless the IAC specifically directs that the material is to remain 'in camera'.

33. The IAC must notify submitters upon release of the Ministers for Planning's assessment and IAC report.

34. Submissions to the IAC are public documents unless otherwise directed by the IAC.

Timing

35. The IAC is required to begin its hearings no later than 20 business days from the final date of the exhibition period, or as otherwise agreed.

36. The IAC is required to submit its report in writing to the Minister for Planning within 30 business days from its last hearing date.

37. The IAC may limit the time of parties appearing before it.

Fee

38. The members of the IAC will receive the same fees and allowances as a panel appointed under Division 1of Part 8 of the P&E Act.

39. All costs of the IAC, including expert advice, technical administration and legal support, venue hire, accommodation, recording proceedings and other costs will be met by the Level Crossing Removal Authority.

Miscellaneous

40. The IAC may retain legal counsel to assist it.

41. Planning Panels Victoria is to provide administrative support to the IAC.

42. . The IAC may engage additional technical and administrative support as required.

43. The IAC may meet and invite others to meet with them when there is at least two of the Committee members present.

Richard Wynne

Richard Wynne MP
Minister for Planning

Date: 28/3/18

REFERRAL NUMBER 2016-R04

The following information does not form part of the Terms of Reference

Project manager

44. For matters regarding the inquiry process, please contact Greta Grivas of Planning Panels Victoria, by phone {03) 8392 5121 or email planning.panels@delwp.vic.gov.au

45. For matters regarding the EES process please contact the Impact Assessment Unit in Department of Environment Land Water and Planning (DELWP) by phone {03) 8392 5503 or email environment.assessment@delwp .vic.gov.au.

REFERRAL NUMBER 2016-R04

Attachment 1

REASONS FOR DECISION UNDER *ENVIRONMENT EFFECTS ACT 1978*

Title of Proposal: **Edithvale and Bonbeach level crossing removals**

Proponent: **Level Crossing Removal Authority**

Description of Project:

This referral is for two crossings that are part of the Victoria Government's program to remove 50 level crossings in Melbourne. These are the level crossing removals at Edithvale Road, Edithvale and Station Street/Bondi Road, Bonbeach. Rail under road has been identified as the preferred option at both Edithvale and Bonbeach. Two trenches, approximately 8 metres deep, 12 metres wide, and 1,000 metres and 1,100 metres long for Edithvale and Bonbeach, respectively, will be constructed within the existing rail corridor.

Decision:

The Minister for Planning has decided that an Environment Effects Statement (EES) required for the project, as described in the referral accepted on 9 March 2017.

Reasons for Decision:

- The project has the potential for a range of significant environmental effects. In particular the project as proposed is likely to have significant effects on:

  the regional groundwater regime resulting in potential changes to hydrological conditions at the Ramsar listed Edithvale-Seaford Wetlands;

  the ecological character and habitat values of the Edithvale-Seaford Wetlands, and the dependent flora and fauna, in particular the critical components of habitat for listed waterbirds, due to alterations in the groundwater regime;

  the protected beneficial uses of groundwater, due to alterations in the groundwater regime, along with risks to human health, recreation and ecosystems due to changes in water quality from activation and excavation of potentially acid sulphate soils and from interception/movement of existing contaminated soil and groundwater.

- Other potential effects on the social or environmental setting are unlikely to be significant and should be readily addressed and mitigated through existing statutory processes and requirements under the *Aboriginal Heritage Act 2006, Environment Protection Act 1970, Planning and Environment Act 1987,* including construction noise, traffic and transport impacts, as well as visual impacts.

- Assessment of potentially significant effects through an EES is necessary to ensure their extent, significance and related uncertainties are sufficiently investigated. Those investigations will inform strategies for avoidance, minimisation or mitigation to ensure acceptable residual effects are achieved.

REFERRAL NUMBER 2016-R04

- An EES would also enable a transparent and rigorous process for consideration of potentially significant adverse effects of the project to inform relevant statutory decision-making, including under the *Planning and Environment Act 1987, Water Act 1989* and *Flora and Fauna Guarantee Act 1995.*

Date of Decision: 5 April 2017

Australian Government
Department of the Environment and Energy

Notification of
REFERRAL DECISION AND DESIGNATED PROPONENT - controlled action

Edithvale and Bonbeach Level Crossing Removal, Victoria (EPBC 2017/7906)

This decision is made under section 75 of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

proposed action	To remove two level crossings at Edithvale Road, Edithvale and Station StreeUBondi Road, Bonbeach, Victoria [see EPBC Act referral 2017/7906].
decision on proposed action	The proposed action is a controlled action. The project will require assessment and approval under the EPBC Act before it can proceed.
relevant controlling provisions	• Ramsar wetlands (sections 16 & 17B) • Listed threatened species and communities (sections 18 & 18A) • Listed migratory species (sections 20 & 20A)
designated proponent	Level Crossing Removal Authority ABN: 69 981 208 782

Decision-maker

Name and position	James Barker Assistant Secretary Assessments and Sea Dumping Branch
Signature	
date of decision	g- May 2017

Appendix B Submitters to the Amendment

No.	Submitter	No.	Submitter
1	Chelsea Bonbeach Train Station Group	30	Deborah Ogden Power
2	Ross Macfarlane	31	Warrick Oakley
3	Margaret Ann Hunter	32	Gabriella Carrazzo
4	Felicity Warren	33	Charles Shane Campbell
5	Lorraine Rees	34	Jennifer Maloni
6	Rosemary Genovese	35	John Lonsdale
7	Karen Perkins	36	Chris Visser
8	Rosenna Hossack	37	Michael Butler
9	Leanne Maloni	38	Debbie Lonsdale
10	Kirralee Ashworth-Collett	39	Andrew Large
11	Glendon Crowe	40	Jacqui Willmore
12	Wayne Durdin	41	Nikki Kewin-Talbot
13	Christine Durdin	42	Kerri Hirst
14	Carol Canestra	43	Kevin Moore
15	Steven Hewitt	44	Tracey Millen
16	Amy Perkin	45	Margaret Flynn
17	Kellie Edwards	46	Joanna Korsch
18	Andrew Costello	47	Kathleen McGee
19	Mia Canestra	48	Ronnelyn Harper
20	Jan Robins	49	Zara Joseph
21	Jasmin Miller	50	Leigh Heywood
22	Maree Brann	51	Jeffrey D'Mello
23	Kim Piercy	52	Karen Tidball
24	Michael James Hughes	53	Alan Dinon
25	Kitty Penfold	54	Donna Elms
26	Rachael Doherty	55	Breearna Ryan
27	Michael Flynn	56	Damian Ryan
28	Kingston Conservation and Environment Coalition	57	Ivan Barbic
29	Robert Bruce Rolls	58	Donna Parker

59	Debra Bunyard	92	Dawn Gay
60	Kerry Petrie	93	Vance Heredia
61	Alison Frowd	94	Caroline Newman
62	Glen Sheppard	95	Kimberley Dennis
63	Karen Wendy Kemp	96	Christian Barber
64	Peter John Sandall	97	Kim Mackellin
65	Nicollette Riccotti	98	Sally Harrowfield
66	Judith Dianne Butler	99	Debbie Grillis
67	Dawn Helen Clark	100	Ingrid Ponchard
68	Colin Reynolds	101	Tim Wraight
69	Esther Blatt	102	Laura Smith
70	Dee Taylor	103	Andrew Boyes
71	P Hegarty	104	Rob Villanti
72	Peter Davis	105	Zoe Miatke
73	Kathy McDevitt	106	Corey Joseph
74	Janine Zaina	107	Carol Doyle-Gleeson
75	Mark Jurisic	108	Arnaud Thierry Russie
76	Treasure Vellis	109	Russell Eames
77	Jennifer Foord	110	Chris Dorigo
78	Jacqui Gately	111	Peter Savage
79	Jen Saric	112	D Brown
80	Georgia Cribb	113	Veronique Chung Yew
81	Cliona Collins	114	Scott Murray
82	Reed Feely	115	Timothy John Stewart Murray
83	Sarah Wilkerson	116	Kerry Thornhill
84	Troy Harvey	117	Anthony Scafidi
85	Kerry Gear	118	William Martin Davies
86	Patrick Degabrielle	119	Breanna Knight
87	Luke Ford	120	Ian Hanson
88	Ryan Taylor	121	Jessie Lopez
89	Barbara Minton	122	Shelley Perry
90	Joanne Fennessy	123	Carlye Weiner
91	Birgit Lapish	124	Domenic Brasacchio

125	Daniela Brasacchio	158	Liz Jowett
126	Andrew Coutts	159	Lisa Klusik
127	Jason Sheppard	160	B Lippe
128	Susan Facey-Smith	161	Alex Matin
129	Amber Renee Ellem	162	Terence Simpson
130	Kay Crane	163	Adrian Barker
131	Dave Middleton	164	Chris Hubbard
132	Joshua Bell	165	Silvia Maria Seibold
133	Julia Young	166	Susan Renee Dexter
134	Julie Easden	167	Fiona McAlinden
135	Sarah Southgate	168	Graham Lindsay King
136	Adrian McInnes	169	Claire Beasy
137	Mark D'Angelo	170	Genevieve Bond
138	Mikhail Lisovetsky	171	M Del Mastro
139	Rachel House	172	Alex Klusik
140	Ross Edwards	173	Carol Cage
141	Angela Bastinac	174	Brendan Reed
142	Damien Damiano	175	Simon Primrose
143	Natalie Roberts	176	Shane Burbidge
144	Nicholas Wotherspoon	177	Tracey Bigg
145	Sarah Popp	178	Tamlyn Dwyer
146	Sharon Cousland	179	Willem Popp
147	Francis Gordon Williams	180	Valerie Joyce Deeth
148	Melinda Cafarella	181	Ryan Joyce Deeth
149	Wendy Antonie	182	Pascale Bicque
150	Stephen Hunter	183	Chelsea Bonbeach Train Station Group
151	Jim Stewart	184	Damian Goodall
152	Dean Simmons	185	Peter James Blair
153	Christine Ann Scharl	186	Joseph Parker
154	Jackie Gadsby	187	Elizabeth Joy
155	William Robert Willocks	188	Vasfi Huseni
156	Anmaree Hudson	189	Trevor Jones
157	Jackson Gillham	190	Wade Ransby

191	Wade Ransby	221	Steve Talbot
192	Wade Ransby	222	Russell and Sue Dowling
193	Wade Ransby	223	Mark and Gerry Gordon
194	Jillian Ann Donaldson	224	Christine Bugbee
195	Catherine Bayly	225	Debbie Saber
196	Christine Bakker	226	City of Kingston
197	Peter Charles Merriner	227	Julia Ogris
198	George Paschalidis	228	David Parton
199	David Van Heythuysen	229	Terry Higgins
200	Indra Roy	230	Jennifer McKay
201	Tara Mogford	231	Susan Heggie
202	Robert and Judy Keller	232	Marie Lahausse
203	Christian Bakker	233	Andrea van Steen
204	Helen Raphael	234	Peter McGown
205	No Sky Rail: Frankston Line Community Association Incorporated	235	Port Phillip Conservation Council Inc.
206	Selina Joseph	236	George Kotsiopoulos
207	Environment Protection Authority Victoria	237	Mandy Stewart
208	Philip B Clarkson	238	Ulrich Janecka
209	Kerry Payne	239	Sean Andrew Wise
210	Ginette Williams	240	Rachael Jane Wise
211	Bob Rolls	241	Murray Lindley
212	Kimberley Castle	242	Kingston Residents Association
213	Friends of Edithvale-Seaford Wetlands Incorporated	243	Cleo Tishler
214	Srijana Shakya-Davis	244	Michelle Moreton
215	Maria Jones	245	Stewart Moreton
216	James Cameron Walker	246	VicTrack
217	Miranda Coppola	247	Peter Katsoulotos
218	Felicity Kaufman	248	Mordialloc Beaumaris Conservation League Inc.
219	Jane Court	249	Les Williams
220	Matthew Hetherington		

Appendix C Parties to the Panel Hearing

Submitter	Represented by
Minister for Planning	Jack Krohn of Department of Environment Land Water and Planning (DELWP) Impact Assessment Unit
Level Crossing Removal Authority (LXRA)	Chris Townshend QC and Rupert Watters of Counsel instructed by Sallyanne Everett and William Bartley of Clayton Utz, who called the following expert evidence: - Tony Cauchi of AECOM GHD JV in Groundwater and Rikito Gresswell of AECOM GHD JV in Groundwater modelling - Kim Chan of AECOM GHD JV in Peer Review Groundwater - Cameron Miller of AECOM GHD JV in Ecology (project areas, wetlands and groundwater dependent ecoysystems) - Mark Stuckey of Environmental Earth Sciences Victoria in Contamination and acid sulfate soils - Peter Myers of AECOM GHD JV in Surface water - Noel Matthews of AECOM GHD JV in Land use planning - Kevin Begg of AECOM GHD JV in Urban design - Stephen Hunt of Ratio Consultants in Traffic - Kym Burgemeister of ARUP in Noise and vibration - Barry Cook of AECOM GHD JV in Air quality
Frank Williams	
Friends of Edithvale-Seaford Wetlands	Scott Seymour, Margaret Ann Hunter and others
Margaret Ann Hunter	
Port Phillip Conservation Council Inc.	Jennifer Warfe
Mordialloc Beaumaris Conservation League Inc.	Mary Rimington
Kingston Residents Association	Trevor Shewan, who called the following expert evidence: - Dr Ian Woodcock and Dr John Stone in Transport
Chelsea Bonbeach Train Station Group	Vicki Jans and Russ Ellis
No Skyrail: Frankston Line Community Association Inc.	William Popp and others
Willem Popp	
Tamlyn Dwyer	
Joseph Parker	
Alan Dinon	
Adrian McInness	

Appendix D Document list

No.	Date	Description	Provided by
1	4/6/2018	Part A Submission on behalf of LXRA	LXRA
2	4/6/2018	DELWP Presentation to Inquiry for the Edithvale and Bonbeach Level Crossing EES	DELWP
3	4/6/2018	Part B Opening on behalf of LXRA	LXRA
4	4/6/2018	Incorporated Document – Version 1 - Edithvale	LXRA
5	4/6/2018	Incorporated Document – Version 1 – Bonbeach	LXRA
6	4/6/2018	Environment Performance Requirements – Version 1	LXRA
7	4/6/2018	Urban Design Framework – Version 4	LXRA
8	4/6/2018	Presentation – LXRA – Design & Construct Overview	LXRA
9	5/6/2018	Expert Witness Statement – Tony Cauchi (Presentation to IAC): Groundwater	Tony Cauchi – AECOM GHD JV
10	5/6/2018	Expert Witness Statement – Kim Chan (Presentation to IAC): Passive Sub-surface Horizontal Drain	Kim Chan – AECOM GHD JV
11	5/6/2018	Expert Witness Statement – Mark Stuckey (Presentation to IAC): CL & CASS – Independent Peer Reviewer	Mark Stuckey – Env. Earth Sciences
12	6/6/2018	Expert Witness Statement – Peter Meyers (Presentation to IAC): Surface Water Impact Assessment	Peter Meyers – AECOM GHD JV
13	6/6/2018	Expert Witness Statement – Cameron Miller (Presentation to IAC): Ecology	Cameron Miller – AECOM GHD JV
14	7/6/2018	Support Documents – Bicycle Facility Options- Sheets 1 to 5 from LXRA (produced 6/6/2018)	LXRA
15	7/6/2018	Expert Witness Statement – Steve Hunt (Presentation to IAC): Traffic Engineering	Steve Hunt – Ratio Consultants
16	7/6/2018	Expert Witness Statement – Kevin Begg (Presentation to IAC): Urban Design	Kevin Begg – AECOM GHD JV
17	7/6/2018	Expert Witness Statement – Noel Matthews (Presentation to IAC): Land Use & Planning	Noel Matthews – AECOM GHD JV
18	13/6/2018	Memorandum – Adequacy of Measuring Stations for Dust & Air Quality	Barry Cook – AECOM GHD JV
19	13/6/2018	New Bridge Crossing Patterson River Rail Corridor – Drawings (5 Sheets)	LXRA
20	13/6/2018	EPR's Version 2 (Both Marked up and Cleanskin Versions)	LXRA
21	13/6/2018	Expert Witness Statement – Lance Lloyd (presentation to IAC): Potential Impact to Seaford-Edithvale Wetlands	Lance Lloyd (Lloyd Env.) - for Kingston City Council

No.	Date	Description	Provided by
22	13/6/2018	Submission from Kingston City Council	Russell Kennedy for Kingston City Council
23	13/6/2018	Edithvale Stormwater Drainage Scheme – document submitted by Kingston City Council.	Kingston City Council / Russell Kennedy
24	13/6/2018	Bonbeach Stormwater Drainage Scheme – document submitted by Kingston City Council.	Kingston City Council / Russell Kennedy
25	14/6/2018	Ecology Australia – Edithvale – Seaford Wetlands RAMSAR Site Management Plan, for Melbourne Water, version dated 26 September 2016.	LXRA
26	14/6/2018	Friends of Edithvale – Seaford Wetlands Inc. – Presentation Submission: (Evidence: Scott Seymour) & Sean Dooley (as Advocates) (Submission # 213).	Friends of Edithvale – Seaford Wetlands – Scott Seymour
27	14/6/2018	Margaret Hunter – Presentation: Comment on EES (Submission # 3).	Ms Margaret Hunter
28	14/6/2018	Port Phillip Conservation Council Inc. – Verbal Submission / Presentation (Submission # 235).	Ms Warfe
29	14/6/2018	Mordialloc Beaumaris Conservation League Inc – Level Crossing Removal Submission (Submission # 248) by Ms Mary Rimington.	Mordialloc Beaumaris Conservation League Inc Ms Mary Rimington
30	14/6/2018	Kingston Residents Association – Presentation tabled dpocument presented on behalf of Mr Trevor Shewan by Denise Pilkington (Submission # 242)	Kingston Residents Association Denise Pilkington for Mr Trevor Shewan
31	14/6/2018	RMIT-MSD / Melb. Univ. 'The Benefits of Level Crossings: Case Study Two: The Frankston Line' by I. Woodcock & Dr J. Stone, 2016	Dr J. Stone
32	14/6/2018	RMIT-MSD / Melb. Univ. 'The Benefits of Level Crossings' by I Woodcock & Dr J Stone, 2016	Dr J. Stone
33	14/6/2018	Excerpt from Geology of Victoria Map, Queenscliff 1:250,000 depicting the Selwyn fault, as provided by John Piper (e-mail through Russell Kennedy Lawyers).	Mr John Piper & Russell Kennedy Lawyers for Kingston City Council
34	15/6/2018	Suggested Marked-up Changes to Incorporated Document from Kingston City Council.	Kingston City Council
35	15/6/2018	Environment Performance Requirements – On Version 2 Mark-up, Suggested Edits from Kingston City Council.	Kingston City Council
36	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part A: Introduction (Submission # 205).	No Sky Rail Frankston Line

No.	Date	Description	Provided by
37	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part B: EES Methodology & Approach (Submission # 205).	No Sky Rail Frankston Line
38	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part C: Commentary on Submissions & Expert Witnesses (Submission # 205).	No Sky Rail Frankston Line
39	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part C2: Commentary on Submissions & expert Witnesses (Submission # 205).	No Sky Rail Frankston Line
40	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part D: Community View (Submission # 205).	No Sky Rail Frankston Line
41	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Part E: Summary (Submission # 205).	No Sky Rail Frankston Line
42	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – No Sky Rail Frankston Line (NSRFL) Response – Appendix – Publicity Material (Submission # 205).	No Sky Rail Frankston Line
43	15/6/2018	Edithvale and Bonbeach Level Crossing Removals – Environmental Effects Statement – Presentation by Mr Willem Popp (Submission # 179).	Mr Willem Popp
44	15/6/2018	Edithvale and Bonbeach Level Crossing Removal EES – Presentation from Ms Tamlyn Dwyer (Submission # 178).	Ms Tamlyn Dwyer
45	15/6/2018	Presentation by Mr Joe Parker (Submission # 186).	Mr Joe Parker
46	15/6/2018	Presentation by Mr Alan Dinon (Submission # 53).	Mr Alan Dinon
47	15/6/2018	Presentation by Mr Adrian McInnes (Submission # 136).	Mr Adrian McInnes
48	15/6/2018	Part C Submission on Behalf of LXRA.	LXRA
49	15/6/2018	Environment Performance Requirements – Version 3 issued from LXRA.	LXRA
50	15/6/2018	Planning Panels Victoria – Inquiry & Advisory Committee Report – Melbourne Metro Rail Project, 21 November 2016, extract from report – closing sections of report.	LXRA
51	15/6/2018	Letter providing information from Dr Woinarski	Mr Sherman for

No.	Date	Description	Provided by
			Council

Appendix E IAC preferred version of the EPRs

EPRs that have been changed from the exhibited version are shown as underlined. Deleted text has been removed to assist legibility.

ENVIRONMENTAL PERFORMANCE REQUIREMENTS

This table is based on the LXRA Version 3 tabled at the hearing with changes shown as proposed by the IAC.

EPR		Discipline	IAC Comments
AH1	**Cultural Heritage Management Plan** Prepare a Cultural Heritage Management in accordance with the *Aboriginal Heritage Regulations 2007* for approval in accordance with the *Aboriginal Heritage Act 2006* Comply with and implement any Cultural Heritage Management Plan approved under the *Aboriginal Heritage Act 2006* that applies to the projects.	Aboriginal heritage	Change proposed by the IAC – see section 12.6.2
AQ1	**Air quality (construction)** Manage construction activities to minimise dust, odour and other emissions in accordance with EPA Victoria Publication 480 *Environmental Guidelines for Major Construction Sites*.	Air Quality	
AQ2	**Air quality management** Control the emission of smoke, dust, fumes and other pollution into the atmosphere during construction and operation, in accordance with the State Environment Protection Policy (Air Quality Management 2001) and State Environment Protection Policy (Ambient Air Quality) 1999.	Air Quality	
B1	**Business Disruption Plan** Minimise impacts to local business through preparation and implementation of a business disruption plan. The business disruption plan must be consistent with an approved Community and Stakeholder Engagement Management Plan (EPR reference SC1) and include: a. transport planning prior to road closures to minimise impacts to business access and parking (EPR reference T1) b. a process for communication with traders and businesses c. management of potential amenity impacts during construction (EPR references AQ1, AQ2, NV2, and NV3).	Business	

EPR		Discipline	IAC Comments
CL1	**Spoil Management Plan** Prior to construction (excluding preparatory works), prepare and implement a Spoil Management Plan(s) in accordance with relevant regulations, standards or best practice guidelines. The plan must be developed in consultation with EPA Victoria. The plan shall be prepared prior to the commencement of construction (excluding preparatory works) and include: a. applicable regulatory requirements b. identifying nature and extent of spoil (clean fill and contaminated spoil) across the construction areas c. roles and responsibilities d. identification of management measures for storage, handling and transport of spoil for the protection of health, amenity and the environment e. identification, design and development of specific management measures for temporary stockpile areas f. identifying potential sites for management for disposal of any spoil <u>including consultation with Kingston City Council to identify nearby sites within Kingston City Council's municipality</u> g. monitoring and reporting requirements h. identifying locations and extent of any prescribed industrial waste (including asbestos) and characterising prescribed industrial waste prior to excavation i. identifying suitable sites for disposal of prescribed industrial waste The Spoil Management Plan shall include an Acid Sulfate Soil Management Plan (refer to EPR reference CL2).	CASS/ Contamination/ Spoil	Change by LXRA in response to Council submission. IAC agrees
CL2	**Acid Sulfate Soil Management Plan** Prepare and implement an Acid Sulfate Soil Management Plan prior to construction of the project to the satisfaction of EPA Victoria, in accordance with the Industrial Waste Management Policy (*Waste Acid Sulfate Soils*) 1999, EPA Victoria Publication 655.1 *Acid Sulfate Soil and Rock*, and relevant EPA regulations, standards and best practice guidance in consultation with EPA Victoria. This plan will include: a. identify locations and extent of potential acid sulfate soils. b. assess potential impact for human health, odour and the environment c. identify and implement measures to prevent oxidation of acid sulfate soils wherever possible d. identify suitable sites for management, reuse or disposal of acid sulfate soils.	CASS/ Contamination/ Spoil	
CL3	**Waste management** Manage wastes during the construction of the projects through development and implementation of a	CASS/ Contamination/	

EPR		Discipline	IAC Comments
	Construction Environmental Management Plan in accordance with EPA Victoria Publication 480 E*nvironmental Guidelines for Major Construction Sites 1996*, EPA Victoria Publication 347.1 *Bunding 2015*, Australian Standard AS1940 St*orage and Handling of Flammable and Combustible Liquids*, and relevant EPA Victoria and Victorian WorkCover Authority regulations, standards and best practice guidance that includes: a. application of the waste management hierarchy in assessing waste management options b. contamination and waste management requirements (e.g. use of waste and recycling facilities, maintenance of a clean site policy) c. designated vehicle refuelling area d. chemical management procedures, such as minimising use and storage of chemicals on site, bunded storage facilities to ensure spills, washing residues, slurries or other contaminated water can be contained, and are managed/disposed of appropriately e. location and type of spill kits required f. staff training and competence requirements g. use of well-maintained plant to minimise the potential for spills to occur h. procedures to remove, treat and/or dispose soil that becomes contaminated due to a fuel or chemical spill i. storage of litter in bins from which it cannot escape (temporary fencing may be used as a secondary containment measure for litter).	Spoil	
CL4	**Acidic and/or contaminated groundwater (construction)** Develop and implement measures to manage acidic and/or contaminated groundwater, in accordance with the State Environment Protection Policy (Groundwaters of Victoria) 1997, State Environment Protection Policy (Waters of Victoria) 2004, State Environment Protection Policy (Prevention and Management of Contamination of Land) 2002, Water Industry Regulations 2006, and relevant EPA Victoria regulations, standards and best practice guidance, which must include: a. a baseline groundwater quality assessment (taking into account site history) at least three months prior to commencement of construction works, where applicable b. implementing a system to manage and/or dispose of intercepted groundwater (if required) which may be a trade waste agreement with relevant utility authority or other measures in accordance with relevant guidelines and legislation (if a trade waste agreement is not granted) c. collection, treatment, disposal and handling of contaminated groundwater and/or slurries, including vapours d. monitoring of intercepted groundwater quality monitoring during construction and water quality monitoring at run-off containment areas e. implementing contamination plume management (if required)	CASS/ Contamination/ Spoil	

EPR		Discipline	IAC Comments
	f. treating and monitoring impacted groundwater (including vapours) prior to disposal, in accordance with licence and/or agreement.		
CL5	**Groundwater Quality Mitigation Plan (operation)** Prepare and fund the implementation of a Groundwater Quality Mitigation Plan in consultation with the land manager of any affected land parcels to manage and mitigate any negative impacts from changes to groundwater quality and/or levels as a result of the projects. The Groundwater Quality Mitigation Plan must be prepared prior to handover of the constructed asset to the rail infrastructure asset manager and must include: a. measures to manage any negative impacts on the beneficial use of groundwater caused by acidification that is attributable to the project(s) so as to maintain existing beneficial use of groundwater b. measures to manage any negative impacts on the beneficial use of groundwater caused by contaminated groundwater transfer or plume migration that is attributable to the project(s) so as to maintain existing beneficial use of groundwater c. measures to manage any negative impacts on the beneficial use of groundwater caused by changes to salinity that is attributable to the project(s) so as to maintain existing beneficial use of groundwater d. identify the entity or entities responsible for implementation of any management and mitigation measures. The Groundwater Quality Mitigation Plan must be implemented if applicable trigger events or levels contained in the Groundwater Management and Monitoring Plan (EPR reference GW3) occur.	CASS/ Contamination/ Spoil	Changed title and wording by LXRA in response to matters arising during the hearing and to improve drafting. IAC agrees
EMF1	**Environmental Management System** Implement an Environmental Management System during construction that is certified to AS/NZS ISO 14001: 2015 *Environmental management systems - Requirements with guidance for use*.	Environmental management	
EMF2	**Environmental management plans** Prepare and implement a Construction Environment Management Plan(s) and other plans as required by the EPRs. The management plan(s) should be prepared in accordance with EPA Victoria Publication 480 *Environmental Guidelines for Major Construction Sites* (EPA Victoria 1996). The process for development and implementation of the management plan(s) must include consultation as specified in the Environmental Management Framework, including with the Kingston City Council, VicRoads, Melbourne Water, EPA Victoria, as relevant to their statutory responsibilities. The management plan(s) must be in place prior to commencement of construction excepting ancillary	Environmental management	

EPR		Discipline	IAC Comments
	activities, preparatory and enabling works.		
EMF3	**Environmental incidents** Prepare and implement a process for managing environmental incidents including: a. classification and definition of environmental incidents b. notification requirements (including timing) to LXRA and relevant regulators c. incident investigation.	Environmental management	
FF1	**Native vegetation and habitat** Any native vegetation removal must be avoided, minimised and managed in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation 2017*.	Ecology	
FF2	**Flora and Fauna Guarantee Act 1988 permits** A permit to take and destroy flora species protected under the *Flora and Fauna Guarantee Act 1988* is required. All permits must be obtained prior to the commencement of works which require approval under the Act.	Ecology	
FF3	**Weeds and pathogens** Develop and implement measures to avoid the spread, or introduction of weeds and pathogens during construction, including vehicle and equipment hygiene.	Ecology	
FF4	**Fauna** Minimise the removal of habitat for fauna. Where fauna habitat is identified for removal, engage a suitably qualified wildlife handler and recovery specialist to check for fauna occupancy and ensure compliance with the *Wildlife Act 1975*. All necessary authorisations must be obtained prior to commencement of works.	Ecology	
FF5	**Protection of retained/adjacent vegetation and habitat** Minimise or avoid unintended impacts on retained and/or adjacent vegetation and habitat by including measures in the Construction Environmental Management Plan(s) and other plans including tree protection zones, environmental no-go zones, fencing and signage, directional lighting, and best practice spill, sedimentation and water runoff management.	Ecology	
FF6	**Landscaping for wildlife** Incorporate native plant species into landscaping that provide wildlife habitat within level crossing removal project areas where appropriate.	Ecology	

EPR		Discipline	IAC Comments
FF7	**Foreshore Native Vegetation Monitoring and Mitigation** Prior to the completion of the Projects, prepare and fund the implementation of a Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Foreshore Native Vegetation) for Edithvale and Bonbeach in consultation with the Department of Environment, Land, Water and Planning and the land manager. The plan should be available to the public. The entity/ies responsible for the preparation and implementation of the Foreshore Native Vegetation Monitoring and Mitigation Plan should be identified. The Plan must be in two parts, monitoring and potential mitigation In respect of monitoring, the Plan must: a. identify areas of coastal vegetation potentially impacted by a change to groundwater quality and/or levels as a result of the projects b. include a process to monitor groundwater to confirm any changes to groundwater quality and/or levels that could result in a loss of coastal native vegetation. Key water quality parameters include salinity and pH. c. include a process for monitoring coastal native vegetation developed by a suitably qualified ecologist d. integrate the groundwater and vegetation monitoring to enable the effects of changes in groundwater levels and/or quality on the vegetation to be determined e. include criteria for determining whether a change in the extent or condition of coastal native vegetation is attributable to the projects f. include the frequency of monitoring if required g. the duration of monitoring must be at least 10 years from the completion of the Projects h. the results of the monitoring program must be published at least annually. The mitigation plan must include contingency measures to mitigate potential impacts attributable to the projects. It must be implemented if trigger levels for changes to groundwater level and quality or foreshore vegetation are identified by the monitoring program. The trigger levels for mitigation must be defined in the Plan.	Ecology	IAC preferred version. Substantially re-worded and added to from the exhibited and LXRA versions. See discussion at sections 11.5 and 11.6.
FF8	**Edithvale and Wannarkladdin Wetlands Monitoring and Mitigation Plan** Prior to the completion of the Projects, prepare and fund the implementation of the Edithvale and Wannarkladdin Wetlands Monitoring and Mitigation Plan in consultation with the Commonwealth Department of Environment and Energy, the Victorian Department of Environment, Land, Water and Planning, Melbourne Water and any other relevant land manager. For both monitoring and mitigation, the Plan must identify a relevant entity or entities and the roles and responsibilities for monitoring and mitigation.	Ecology	IAC preferred version. Substantially re-worded and added to from the exhibited and LXRA versions. See discussion at sections 10.7 and 10.8.

EPR		Discipline	IAC Comments
	The Plan must be available to the public. The Plan must be in two parts: monitoring and potential mitigation. In respect of monitoring, the Plan must: a. Include a process to review data collected by Melbourne Water through existing and ongoing baseline monitoring of groundwater levels, surface water levels and water quality within and around the Wetlands together with a data and monitoring gap analysis comparing monitoring or any conducted and information required to assess potential impacts of the Projects b. Detail those monitoring steps and data collection not otherwise undertaken or able to be sourced from Melbourne Water or other entity, further monitoring measures identified in (c) (d) (e) and (f) c. Include monitoring of groundwater levels and groundwater quality at representative and strategic locations within and around the Edithvale and Wannarkladdin Wetlands, and along transects between the Project areas and the wetlands d. Include monitoring criteria such as: • surface water levels • surface water quality • condition and extent of relevant vegetation communities • condition and extent of habitat for important birds • presence/absence and abundance of migratory and threatened bird species e. Specify the frequency of monitoring for each parameter f. Include monitoring suitable for determining whether a change at the Wetlands is attributable to the project(s) and requires mitigation g. The monitoring must commence at outset of the Projects and continue for 10 years, or any further period reasonably required if any negative impacts of the Projects on the Wetlands have been identified h. the results of the monitoring program must be published at least annually. The potential mitigation plan should include mitigation measures to be implemented in the event applicable change criteria are triggered, including: • ecological restoration measures developed by a suitably qualified ecologist that would be implemented to mitigate the effect of impacts attributable to the project(s) • engineering measures to reinstate the Wetlands to pre-impact conditions to the		

EPR		Discipline	IAC Comments
	extent practicable The mitigation measures must be implemented if applicable events or trigger levels defined in the Edithvale and Wannarkladdin Wetland Monitoring and Mitigation Plan occur. The applicable events or trigger levels for mitigation must be defined in the Plan. The criteria or trigger levels for mitigation should include changes to groundwater levels and/or quality along transects between the Project areas and the wetlands, as these may provide early warning of potential impacts.		
FF9	**Bonbeach foreshore native vegetation** Prior to handover of the Projects to the rail infrastructure asset manager, fund Kingston City Council to enhance foreshore native vegetation. The funding amount may be guided by an offset assessment and credit value pursuant to the DELWP Guidelines and/or by agreement.		New EPR proposed by the IAC in response to submissions by LXRA and Council. See sections 11.5 and 11.6.
GM1	**Pre-construction condition survey** Conduct a pre-construction condition survey(s) for buildings, structures and other assets predicted to be damaged as a result of vibration, subsidence or ground movement caused by the Projects. Develop and maintain a database of pre-construction and as-built condition information for each potentially affected building, structure and other asset identified as being in an area susceptible to damage (see EPR reference GM2), specifically including: a. identification of buildings, structures and other assets predicted to be damaged from vibration, subsidence or ground movement from the Projects b. results of pre-construction condition surveys of buildings, structures, and other assets predicted to be damaged as a result of vibration, subsidence or ground movement caused by the Projects, to establish baseline conditions and potential vulnerabilities c. records of consultation with land owners in relation to the pre-construction condition surveys d. post-construction stage condition surveys conducted, where required, to ascertain if any damage has been caused to any building, structure or other asset as a result of vibration, subsidence or ground movement caused by the Projects e. proactively share with the land owner the results of pre-construction condition surveys, post-construction condition surveys and records of consultation f. ensure all stakeholder engagement activities are undertaken in accordance with the Community and Stakeholder Engagement Management Plan (see EPR reference SC1).	Land stability	Change by LXRA in response to matters arising during the hearing and to improve drafting. IAC agrees
GM2	**Repairs to properties due to vibration, subsidence or ground movement** For buildings, structures and other assets damaged as a result of vibration, subsidence or ground movement caused by the Projects, undertake required repair works or other actions as agreed with the	Land stability	Change by LXRA in response to matters arising during the hearing and to improve drafting.

EPR		Discipline	IAC Comments
	property owner.		IAC agrees
GW1	**Rail trench design** The projects will be designed as rail trenches to meet applicable design standards and comply with the EPRs developed for the Projects. The Edithvale Project design must include: a. Independent peer review (EPR reference GW4) b. a groundwater management system to minimise changes to groundwater levels and flows caused by the Edithvale Project to meet the groundwater performance outcomes specified in EPR reference GW2 c. engineering redundancy/contingency to ensure the proposed design is capable of continuously achieving the groundwater performance outcomes (EPR reference GW2) d. maintenance and inspection facilities (EPR reference GW5). e. design components including: i. provision for monitoring the quality of groundwater diverted or transferred ii. measures to ensure contaminated groundwater is not transferred or diverted to sub-surface locations other than its pre-construction destination	Groundwater	LXRA proposed changes in response to the recommendation of Tony Cauchi (expert report, sections 4.3.1 and 4.3.3). Further changes are recommended by the IAC as shown. Refer section 6.8
GW2	**Groundwater performance outcomes** The tanked rail trenches at Edithvale and Bonbeach must be designed ~~and operated~~ to ensure that changes to groundwater as a result of the projects do not result in: a. groundwater mounding that increases waterlogging at ground level b. groundwater drawdown that could cause damage to buildings, structures and other assets as a result of ground subsidence or an adverse impact to sub-surface structures c. degradation to groundwater quality (including as from acidification, changes to salinity, contaminant transfer or contaminant plume migration) that would have a negative effect on land use or beneficial use of groundwater d. changes to groundwater that would have negative impacts on groundwater dependent ecosystems e. changes to groundwater level that would have a significant negative impact to groundwater extraction from bores as a beneficial use. The performance of the installed rail trenches must be inspected, maintained (EPR reference GW5) and monitored (EPR reference GW3) to ensure they are not having any impacts on groundwater levels and quality beyond those set out above. Further mitigation measures must be implemented if a change to groundwater level or quality that is not in accordance with this or other applicable EPRs is observed (EPR references GW3, FF7, FF8, CL5).	Groundwater	LXRA proposed changes in response to the recommendation of Tony Cauchi (expert report, sections 4.3.1 and 4.3.3). Further changes (new e) and last para) are recommended by the IAC as shown. Refer section 6.8.

EPR		Discipline	IAC Comments
GW3	**Groundwater Monitoring and Management Plan** Prior to construction (excluding preparatory works), prepare and fund the implementation of a Groundwater Monitoring and Management Plan to the satisfaction of EPA Victoria, Melbourne Water, Kingston Council, DELWP and relevant water authorities to monitor and manage predicted and potential impacts to groundwater as a result of the Projects. The Groundwater Monitoring and Management Plan must be prepared prior to the construction of the piled trench walls and once prepared it must be implemented. Monitoring should commence prior to the installation of the piled trench walls to establish baseline conditions. The Groundwater Monitoring and Management Plan must include: a. detailed groundwater monitoring parameters including timing and location of monitoring bores, including: along the rail corridor; around and within the Edithvale and Wannarkladdin Wetlands; in the vicinity of the foreshore vegetation; and along multiple transects between the railway line and the Edithvale and Wannarkladdin Wetlands b. parameters and timing for monitoring groundwater to identify any changes to contaminant transfer or plume migration caused by the Edithvale project c. duration of the groundwater monitoring program for at least 10 years d. provision for periodic review as required, and not less than every second year, to consider the adequacy of the groundwater monitoring program and the need for future groundwater monitoring. e. the entity responsible for the implementation of the Plan. f. the entity responsible for the ownership and management of monitoring network assets g. clear trigger events or levels for changes in groundwater level or qualitythat require one or more of the following actions: i. actions to maintain or reinstate compliance with groundwater performance outcomes (EPR reference GW2) ii. operational maintenance of the Edithvale Project to ensure that the groundwater management system continues to perform effectively (EPR reference GW5) iii. implementation of the Groundwater Quality Mitigation Plan (EPR reference CL5) iv. implementation of the mitigation component of the Foreshore Native Vegetation Monitoring and Mitigation Plan (EPR reference FF7) v. implementation of the mitigation component of the Edithvale and Wannarkladdin Wetlands Monitoring and Mitigation Plan (EPR reference FF8).	Groundwater	LXRA proposed changes in response to submissions. Further changes are recommended by the IAC as shown. Refer section 6.8

EPR		Discipline	IAC Comments
	h. details of contingency mitigation measures if the proposed groundwater management solution does not perform as predicted or intended. The groundwater monitoring program should be integrated with the monitoring of the wetlands and foreshore vegetation (EPRs FF7 and FF8) to provide the groundwater data required for FF7 and FF8. The Groundwater Monitoring and Management Plan must be made publicly available and results from the monitoring program should be reported to the public annually.		
GW4	**Independent peer review** Prior to construction (excluding preparatory works): a. the proposed design of the Edithvale project must be peer reviewed by an appropriately qualified specialist to confirm that the proposed design (EPR reference GW1) is capable of achieving the groundwater performance outcomes (EPR reference GW2) b. the Groundwater Monitoring and Management Plan (EPR reference GW3) must be peer reviewed by an appropriately qualified specialist. The appointment of the peer reviewer for this plan must be to the satisfaction of EPA.	Groundwater	LXRA proposed changes in response to the submission of the EPA and the recommendation of Mark Stuckey (expert report section 7.3). Further changes are recommended by the IAC as shown. Refer section 6.8
GW5	**Operational maintenance** The Edithvale Project must be inspected and maintained to ensure that the groundwater the groundwater management system, including any mitigation continues to perform effectively.	Groundwater	Change by LXRA in response to matters arising during the hearing and to improve drafting. IAC agrees and has made further minor change
HH1	**Unidentified historical archaeological sites** Minimise impacts on any unidentified historical archaeological sites and values discovered during construction through the development and implementation of an archaeological discovery protocol. The management protocol would be consistent with the *Heritage Act 2017* and developed in consultation with Heritage Victoria, and include a procedure for ceasing work if remains are discovered, notifying Heritage Victoria, obtaining consent and dealing with remains.	Historic heritage	
HH2	**Heritage overlay sites** Avoid adverse impacts to the Chelsea Clock Tower and Chelsea Railway Station during construction through the implementation of no-go zones through the environmental management plan(s) and other plans if required. Undertake a pre-condition survey in accordance with EPR reference GM1.	Historic heritage	
HH3	**Heritage values** Avoid or minimise, to the extent practicable, adverse visual impacts on adjoining heritage places, and maintain landscape character and significant heritage precinct values (where relevant) by applying the urban design	Historic heritage	

<table>
<tr><th colspan="2">EPR</th><th>Discipline</th><th>IAC Comments</th></tr>
<tr><td></td><td>framework and project specific Urban Design Guidelines during the design development process.</td><td></td><td></td></tr>
<tr><td>LP1</td><td>Land use (construction)
The construction approach should:
a. avoid or minimise impacts to existing land uses on private and public land (including public open space) from temporary works and permanent structures as far as practicable
b. reduce the disruption, to the extent practicable, to current users of public and council land resulting from temporary occupation
c. include opportunities to implement landscaping enhancement.</td><td>Land Use</td><td></td></tr>
<tr><td>LV1</td><td>Landscape and visual opportunities
Minimise negative landscape and visual impacts, and maximise opportunities for enhancement of public amenity and facilities to the extent practicable, through the application of the Urban Design Guidelines specific to each project in consultation with relevant stakeholders, including Kingston City Council.</td><td>LVIA</td><td></td></tr>
<tr><td>LV2</td><td>Lighting
Design lighting used during operation of permanent structures in accordance with relevant standards to minimise light spillage and protect the amenity of adjacent land uses to the extent practicable.</td><td>LVIA</td><td></td></tr>
<tr><td>LV3</td><td>Light spillage
Light spillage must be minimised during construction to protect the amenity of adjacent land uses to the extent practicable.
The environmental management plan(s) and other plans must include requirements and methods to minimise light spillage, to the extent practicable, during construction to protect the amenity of adjacent and surrounding residential land uses, neighbourhoods, parks, community facilities including urban environments, and any known significant native fauna habitat, in consultation with relevant stakeholders.</td><td>LVIA</td><td></td></tr>
<tr><td>NV1</td><td>Operational noise
Design must ensure airborne noise generated by train movements at sensitive receptor locations are in accordance with the Passenger Rail Infrastructure Noise Policy 2013.
<table><tr><td>Time</td><td>Type of receiver</td><td>Investigation threshold</td></tr></table></td><td>Noise/Vibration</td><td></td></tr>
</table>

<table>
<tr><th>EPR</th><th>Discipline</th><th>IAC Comments</th></tr>
<tr><td></td><td>
<table>
<tr><td>Day
(6am – 10pm)</td><td>• Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks
• Noise-sensitive community buildings, including schools, kindergartens, libraries</td><td>65 dBL_{Aeq} and a change in 3 dB(A) or more
or
85 dBL_{Amax} and a change in 3 dB(A) or more</td></tr>
<tr><td>Night
(10pm – 6am)</td><td>• Residential dwellings and other buildings where people sleep including aged persons homes, hospitals, motels and caravan parks</td><td>60 dBL_{Aeq} and a change in 3 dB(A) or more
or
85 dBL_{Amax} and a change in 3 dB(A) or more</td></tr>
</table>
Design fixed assets to achieve compliance with State Environment Protection Policy (Control of Noise from Commerce, Industry and Trade) No. N-1.
</td><td></td><td></td></tr>
<tr><td>NV2</td><td>Construction noise
Prior to construction (excluding preparatory works), prepare a Construction Noise and Vibration Management Plan for the projects in consultation with EPA Victoria and Kingston City Council.
Manage construction noise and vibration in accordance with EPA Victoria Publication 1254 Noise Control Guidelines, 2008 unless otherwise specified in the Construction Noise and Vibration Management Plan prepared for the projects.
The Construction Noise and Vibration Management Plan must be prepared prior to commencement of construction (excluding preparatory works) and include:
a. the identification of sensitive receptors along the project alignment
b. details of construction activities and an indicative schedule for construction works, including the identification of noise and/or vibration generating construction activities that have the potential to impact sensitive receptors
c. measures to ensure effective monitoring of noise and vibration associated with construction
d. how construction noise (including truck haulage) and vibration will be minimised, including:
i. the scheduling of noisy works to typical construction hours where feasible (i.e. Monday to Friday 07:00 am to 6:00 pm, and Saturday 07:00 am to 1:00 pm)
ii. limiting night works outside of the main occupation periods</td><td>Noise /Vibration</td><td></td></tr>
</table>

EPR		Discipline	IAC Comments
	iii. the planning of site works to limit vehicle movements to certain locations and time periods iv. the substitution of noisy plant or processes with quieter options (e.g. broadband reversing and movement alarms instead of conventional beepers) v. the provision of temporary noise barriers where practicable vi. monitoring of noise and/or vibration associated with construction vii. notifying residents who may be impacted by noise and/or vibration in advance of the works viii. a procedure for managing complaints. The plan must outline airborne noise management levels and mitigation measures for evening and night time works. The management level is not a noise limit or target, but represents noise levels above which community reaction may be adverse and which should trigger mitigation actions to minimise the noise impact. Depending on noise levels, noise mitigation measures may include an offer of respite and relocation, in accordance with a Respite and Relocation Policy (see EPR reference SC2) and Community and Stakeholder Engagement Management Plan (see EPR reference SC1).		
NV3	**Construction vibration** Identify potential sensitive receptors (including heritage places) and potential impacts from vibration during the construction period. Where relevant, conduct condition surveys and monitoring of sensitive receptors. <u>For human comfort, implement management actions if the Guideline Targets in Table 1 in BS6472-1:2008 for continuous, intermittent, or impulsive vibration are not achieved.</u> <u>For structural damage to buildings, implement management actions if the Guideline Targets in DIN4150-3:1999 for structural damage to buildings are not achieved.</u> If impacts from vibration are anticipated, management and mitigation measures may include: a. substituting high vibration plant or processes with lower vibration options b. utilising vibration monitoring to inform management and mitigation c. relocation of residents (EPR reference SC2) d. communication with potentially affected residents in accordance with the Community and Stakeholder Engagement Management Plan (EPR reference SC1).	Noise /Vibration	LXRA proposed change in response to the recommendation of Kym Burgemeister (expert report, page 4). IAC agree
SC1	**Community and Stakeholder Engagement Management Plan** Prior to construction (excluding preparatory works), prepare and implement a Community and Stakeholder Engagement Management Plan in consultation with Kingston City Council that: a. identifies all project activities that potentially impact on community and business operations, and	Social	

EPR		Discipline	IAC Comments
	provides for well-coordinated communication and engagement processes b. consults with and addresses needs of vulnerable groups that would be impacted by the project such as the elderly, socio-economically disadvantaged groups and children c. consults with and addresses needs of users of community facilities impacted by the project such as schools, child care, aged care, and caravan parks d. sets out processes and measures to provide advanced notice to key stakeholders and other potentially affected stakeholders of construction activities (including any staged works, early works, main works, or out of hours works), significant milestones, changed traffic conditions, interruptions to utility services, changed access and parking conditions, periods of predicted high noise and vibration activities, including contact details for enquiries/complaints e. provides for any interested stakeholder to register their contact details to ensure they are automatically advised of planned construction activities, project progress, mitigation measures and intended reinstatement measures where applicable f. documents a complaints management process (including processes and measures for registering, managing and resolving complaints) consistent with Australian Standard AS/NZS 10002: 2014 *Guidelines for Complaint Management in Organisations*.		
SC2	**Respite and Relocation Policy** Prior to construction (excluding preparatory works), prepare and implement a Respite and Relocation Policy to be offered to residents whose amenity is significantly affected by construction activities (e.g. out-of-hours works or sustained loss of amenity during the day for residences with special circumstances such as shift workers), or who are subject to loss of access. The Respite and Relocation Policy will only apply during the period in which residents are (or are likely to be) affected. The Policy must contain: a. the criteria that must be met for <u>voluntary and temporary</u> relocation to be offered to affected residents, <u>taking into account</u>: i. <u>the level of noise and vibration impact</u> ii. <u>the duration of the noise and vibration impact</u> iii. <u>loss of access</u> iv. <u>the type and duration of out-of-hours work covered by the policy</u> v. <u>time of day at which the work occurs</u> b. consideration of special circumstances such as language or cultural need, special needs related to health	Social	LXRA proposed change in response to the recommendation of Kym Burgemeister (expert report, page 4). IAC agree

EPR		Discipline	IAC Comments
	conditions or home businesses c. engagement measures and mitigation measures, for example: i. respite offer (e.g. pre-purchased movie tickets) ii. earplugs (recognising that some people may prefer to stay at home during the relevant works) iii. alternative accommodation.		
SC3	**Recreational facilities** Where construction works directly impact on sports clubs or passive recreation users of directly impacted sporting and recreational facilities, work with affected sporting clubs and land managers to identify appropriate management measures, including provision of alternative facilities for the period of disruption.	Social	
SS1	**Sustainability** Achieve LXRA's sustainability policy to: a. demonstrate leadership in the commitment to a prosperous and integrated economic, social and environmentally sustainable future b. seek opportunities to enhance the value of natural systems c. pioneer innovation in sustainable design that seeks continuous improvement.	Sustainability	
SS2	**Climate change** Design projects in accordance with the most up-to-date climate change assumption guidance provided in the *Guidelines for Assessing the Impact of Climate Change on Water Supplies in Victoria* (DELWP, 2016) and the *Planning for Sea Level Rise Guidelines* (Melbourne Water, 2017) in order to manage climate change uncertainty in design, construction and operation.	Sustainability	
SW1	**Stormwater management - construction** Protect local waterways by applying best practice sedimentation and pollution control measures in accordance with EPA Victoria publication 480 *Environmental Guidelines for Major Construction Sites* through the Construction Environmental Management Plan(s) and other plans. Implement a water collection and treatment system to ensure that stormwater discharges comply with the State Environment Protection Policy (Waters of Victoria) 2004.	Surface Water	
SW2	**Water quality - operation** The design must include a water collection and treatment system to ensure that stormwater discharges comply with State Environment Protection Policy (Waters of Victoria) 2004 and do not impact beneficial uses of that waterbody.	Surface Water	LXRA proposed change in response to the recommendation of Peter Meyers (expert report, section 4.3).

EPR		Discipline	IAC Comments
	This would include adopting water sensitive urban design and integrated urban water management principles in the stormwater management design, in accordance with the LXRA's Urban Design Framework and the specific Urban Design Guidelines for the projects, and CSIRO publication *Urban Stormwater Best Practice Environmental Management Guidelines 1999* in consultation with Melbourne Water and Kingston City Council as applicable.		IAC agree
SW3	**Drainage network - construction** Design surface water discharge and quality to have no adverse impact to the drainage network capacities in consultation with Melbourne Water and Kingston City Council as required.	Surface Water	Change by LXRA in response to matters arising during the hearing and to improve drafting. IAC agrees
SW4	**Drainage network – operation** Design surface water discharge and quality to have no adverse impact to the drainage network capacities in consultation with Melbourne Water and Kingston City Council as required.	Surface Water	Change by LXRA in response to matters arising during the hearing and to improve drafting. IAC agrees
SW5	**Flood protection - construction** Maintain existing levels of flood protection associated with overland flow paths (considering flood levels, flows and velocities) during temporary construction works through compliance with Melbourne Water and Kingston City Council requirements for flooding and overland flows.	Surface Water	
SW6	**Flood protection - operation** Design infrastructure to maintain existing levels of flood protection associated with overland flow paths (considering flood levels, flows and velocities) through compliance with Melbourne Water and Kingston City Council requirements for flooding and overland flows.	Surface Water	
T1	**Transport Management Plan** Prior to the commencement of construction (excluding preparatory works), develop and implement a Transport Management Plan(s) to minimise disruption (to the extent practicable) to affected local land uses, traffic, car parking, on-road public transport, pedestrian and bicycle movements and existing public facilities during all stages of construction. The plan(s) must be developed in consultation with the relevant road management authorities and be informed and supported by an appropriate level of transport analysis. The plan(s) must include: a. a monitoring program to monitor impacts of construction activities to all modes of active and passive transport. Where monitoring identifies adverse impacts, practicable mitigation measures must be developed and implemented b. consideration of cumulative impacts of other major projects operating concurrently in the local area c. identify the route options for construction vehicles (including haulage of spoil and other heavy materials to	Traffic	

EPR		Discipline	IAC Comments
	and from site) travelling to and from the project construction site, recognising sensitive receptors, and minimising the use of local streets where practicable d. be prepared in consultation with emergency services, develop suitable measures to ensure emergency service access is not inhibited as a resultof project construction activities e. allow for the provision of alternative parking where practicable to replace public and commuter parking lost as a result of project construction activities and to prevent construction-related parking on local roads or use of public car parks f. allow for the provision of car parking or park and ride facilities for construction workers g. provisions for the minimisation of impacts on existing connectivity for pedestrians, cyclists, public transport and road vehicles as a result of construction (including laydown areas), including the identification of alternative routes for pedestrians and cyclists and other measures to maintain connectivity and safety for pedestrians and cyclists h. management of any temporary or partial closure of roads and traffic lanes, including provision for suitable routes for vehicles, cyclists and pedestrians, to maintain connectivity for road and footpath users i. an approach for maximising the current road capacity on Nepean Highway and Edithvale Road during peak periods j. restrictions to the number of local roads to be used for construction-related transportation to minimise impacts on amenity, in consultation with the relevant road authorities k. reinstatement of access to open space, community facilities, commercial premises and dwellings if disrupted, as soon as practicable, and to an equivalent standard l. provision for safe access points to laydown areas and site compounds m. a communications strategy to advise affected users, potentially affected users, relevant stakeholders and the relevant road authorities of any changes to transport conditions in accordance with the Community and Stakeholder Engagement Management Plan (EPR reference SC1). The plan may include specific measures for discrete components or stages of the works having the potential to impact on roads, shared use paths, bicycle paths, footpaths or public transport infrastructure.		
T2	**Public Transport Disruption Management Plan** Prior to commencement of works significantly affecting public transport services, develop and implement a plan for minimising disruption to public transport services (rail, bus) resulting from project construction activities. The plan must be developed in consultation with VicTrack, V/Line, Public Transport Victoria, the Department of Economic Development, Jobs, Transport and Resources (Transport) and Metro Trains Melbourne, as relevant.	Traffic	

EPR		Discipline	IAC Comments
T3	**Pedestrian and cyclist connectivity** Optimise the design in accordance with the principles and objectives of LXRA's Urban Design Guidelines to maintain and enhance pedestrian and cyclists connectivity in consultation with relevant road authorities, Kingston City Council and Public Transport Victoria where appropriate.	Traffic	
T4	**Intersection design and performance** Intersections must be designed and constructed to provide safe vehicle movements to the satisfaction of the responsible road management authority. Undertake an intersection analysis to ensure acceptable intersection performance.	Traffic	
T5	**Car parking** Where practicable, ensure no net loss in station car parking for rail users upon completion, and car parking must be replaced or reinstated at the earliest opportunity.	Traffic	
T6	**Vehicle and pedestrian access** Where vehicle and pedestrian access are altered during construction, ensure that vehicle and pedestrian access is replaced, in accordance with relevant road design standards.	Traffic	
T7	**Debris on roads** Minimise dirt and debris on the roads from construction activities by measures including: a. street sweeping b. covering all truck loads that have the potential to result in debris on public roads c. cleaning vehicles and tyres when leaving construction sites.	Traffic	
T8	**Emergency services** Maintain vehicular and pedestrian access to hospital emergency departments at all times during construction and to other key health and medical facilities, where practicable.	Traffic	
UD1	**Urban Design Guidelines** Design projects in accordance with the LXRA Urban Design Framework and project specific Urban Design Guidelines. The Urban Design Guidelines must consider: a. identity b. connectivity and wayfinding c. urban integration	Urban design	IAC recommended change See section 12.5

EPR		Discipline	IAC Comments
	d. resilience and sustainability e. amenity f. vibrancy g. safety h. accessibility i. resilience and comfort for the community in a climate change future j. vegetation replacement as a design and development component Seek the advice of the LXRA Urban Design Advisory Panel (chaired by the Office of the Victorian Government Architect, and includes officers of Kingston City Council) during the preparation of detailed design to ensure an appropriate response to the LXRA Urban Design Framework.		
UD2	**Hoardings** Minimise visual impacts during construction (where possible) with the installation of hoardings. Hoarding must be installed to LXRA's hoarding requirements in consultation with the Kingston City Council.	Urban design	

Appendix F IAC preferred version of the Incorporated Documents

Changes are tracked against the exhibited version.

Edithvale Road, Edithvale
Level Crossing Removal Project

Incorporated Document

~~January~~ July 2018

Incorporated document pursuant to section 6(2)(j) of the *Planning and Environment Act 1987*

1.0 INTRODUCTION

This document is an incorporated document in the Kingston Planning Scheme (**planning scheme**) and is made pursuant to section 6(2)(j) of the *Planning and Environment Act 1987*.

The land identified in Clause 3.0 of this document may be used and developed in accordance with the specific controls in Clause 4.0 of this document.

The control in this document prevails over any contrary or inconsistent provision in the planning scheme.

2.0 PURPOSE

The purpose of this incorporated document is to allow and facilitate the use and development of land described in clause 3.0 for the purposes of the Edithvale Road, Edithvale ~~Station Street/Bondi Road, Bonbeach~~ **Level Crossing Removal Project**~~, including a railway, railway station, and associated upgrades to the road and rail network~~ (Project).

3.0 LAND

This ~~e control in this~~incorporated **document applies to the land** described as "Edithvale Road, Edithvale - EES Project Area" ~~required for the Project~~ as shown in the Project Area Maps forming part of this document (**Land**).

4.0 CONTROL

4.1 EXEMPTION FROM PLANNING SCHEME REQUIREMENTS

Despite any provision to the contrary, or any inconsistent provision, in the planning scheme, no planning permit is required for, and no planning provision in the planning scheme operates to prohibit, ~~or~~ restrict or regulate the use or development of the Land for the purposes of the Project.

The Project includes, but is not limited to, the following:

a) Removal of the level crossing at Edithvale Road, Edithvale ~~Station Street/Bondi Road, Bonbeach~~ where it crosses the Frankston rail line.

b) Railway construction and associated works to lower the existing Frankston rail line under Edithvale Road~~Station Street/Bondi Road~~, including, but not limited to, bulk excavation, relocation of existing utilities and installation of new utility infrastructure, earthworks, installation of drainage and retaining walls, replacement of track infrastructure, access tracks, landscaping, vegetation removal and construction and use of bicycle and pedestrian shared use paths.

c) Road construction and associated works including construction of a road bridge over the Frankston rail line at Edithvale Road ~~Station Street/Bondi Road~~ and associated works including alterations to road access arrangements.

d) Development of a new railway station, including provision for the sale of food, drink and other convenience goods and services, decking over the trench, car parking, bicycle facilities and loading and unloading facilities.

e) Provision of pedestrian access and shared bicycle use paths, including the construction of pedestrian bridges over the railway line.

f) Associated rail infrastructure, including power upgrades and overhead infrastructure, cabling and signaling.

g) Creation and alteration of access to roads.

h) Ancillary activities, preparatory and enabling works, including, but not limited to:

i) Use and development of lay down areas for construction purposes.

ii) Stockpiling of excavation material.

iii) Use and development of temporary site workshops and storage, administration and amenities buildings, access and vehicle parking.

iv) Removal, destruction or lopping of trees and vegetation, including native vegetation and dead native vegetation.

v) Demolition and removal of buildings, structures and works.

vi) Relocation, modification and upgrade of services and utilities.

vii) Construction of fences, temporary site barriers and site security.

viii) Construction or carrying out works to create or alter roads, car parking areas, bunds, mounds, landscaping, excavate land, salvage artefacts and alter drainage.

ix) Earthworks including cutting, stockpiling and removal of spoil, and the formation of drainage works.

x) Display of construction, directional or identification signs.

xi) Subdivision and consolidation of land.

4.2 CONDITIONS

The use and development permitted by this document must be undertaken in accordance with the following conditions:

Environmental Management Framework

4.2.1 Prior to the commencement of development (excluding preparatory buildings and works under clause 4.3), an Environmental Management Framework (EMF) must be approved by the Minister for Planning. The EMF must:

a) include the Environmental Performance Requirements applicable to the design, development and operation of the Project;

b) be prepared generally in accordance with the Environmental Management Framework contained in the Environment Effects Statement for the Edithvale and Bonbeach Level Crossing Removal Projects except where otherwise agreed to by the Minister for Planning including to give effect to the outcomes of the Minister's Assessment under the Environment Effects Act 1978.

~~The Project must be designed and constructed in accordance with the Edithvale and Bonbeach Level Crossing Removal Project EES Environmental Management Framework (EMF).~~

4.2.2 The EMF may be amended from time to time, to the satisfaction of the Minister for Planning.

4.2.3 The use and development must be carried out in accordance with the approved EMF.

Native Vegetation

4.2.4 Details of the proposed removal, destruction or lopping of native vegetation necessary for the construction of the Project must be prepared in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (Department of Environment, Land, Water and Planning, 2017) to the satisfaction of the Secretary to the Department of Environment, Land, Water and Planning (**DELWP**), except as otherwise agreed by the Secretary to DELWP.

4.2.5 Native vegetation offsets must be provided in accordance with the *Guidelines* for the removal, destruction or lopping of native vegetation (DELWP, 2017), except as otherwise agreed by the Secretary to DELWP.

Heritage Management

4.2.6 Where, but for this incorporated document, a planning permit would be required for buildings and works or subdivision within a Heritage Overlay, site plans and elevations showing the extent of buildings and works must be prepared to the satisfaction of the Minister for Planning, except as otherwise agreed by the Minister for Planning.

4.2.7 Where, but for this incorporated document, a planning permit would be required for the demolition, alteration, or removal of a building within a Heritage Overlay, a full photographic survey of the buildings, comprising photographs of both the exterior and interiors of the buildings and contextual images of the buildings environs and their settings, must be prepared to the satisfaction of the Minister for Planning, except as otherwise agreed by the Minister for Planning.

Flood Management

4.2.8 Where, but for this incorporated document, a planning permit would be required for buildings and works on land within the Special Building Overlay, the buildings and works must be undertaken to the satisfaction of the relevant floodplain management authority.

Road Access

4.2.9 The creation and alteration of access to a road in a Road Zone Category 1 must be to the satisfaction of the Roads Corporation.

4.2.10 Subdivision of land adjacent to a road in a Road Zone Category 1 must be to the satisfaction of the Roads Corporation.

Other Conditions

4.2.11 Unless otherwise stated, the plans and other documents listed in Clause 4.2 must be approved prior to the commencement of works. Plans and other documents may be prepared and approved for separate components or stages of the Project but each plan or other document must be approved before commencement of works for that component or stage.

4.2.12 The plans and other documents may be amended from time to time to the

satisfaction of the Minister for Planning or the relevant approving authority. In deciding whether a plan or other document is satisfactory or whether to consent to an amendment to a plan or other document, the Minister for Planning or the relevant approving authority may seek the views of council and any other relevant authority.

4.2.13 The use and development of the Land must be undertaken generally in accordance with the approved plans and documents.

4.3 PREPARATORY AND OTHER WORKS

The following buildings and works and uses may commence on the Land prior to the approval of the plans and other documents listed in Clause 4.2:

a) Preparatory works for the Project including but not limited to:

i) Works, including vegetation removal, where but for this incorporated document, a planning permit would not be required under the provisions of the planning scheme.

ii) Investigation, testing and preparatory works to determine the suitability of land, and property condition surveys.

iii) Construction access points and working platforms.

iv) Site establishment works including temporary site fencing and hoarding, site offices, and hardstand and laydown areas.

v) Construction, protection, modification, removal or relocation of utility services, rail signaling, overhead and associated infrastructure.

vi) Establishment of environment and traffic controls, including designation of 'no-go' zones.

vii) Establishment of temporary car parking.

viii) Demolition to the minimum extent necessary, to enable preparatory works.

ix) Salvage and relocation of aboriginal cultural heritage material and other management actions in accordance with the relevant Cultural Heritage Management Plan approved under the *Aboriginal Heritage Act 2006* or otherwise in compliance with that Act.

b) The removal, destruction or lopping of native vegetation to the minimum extent necessary to enable preparatory works to the satisfaction of the Minister for Planning. Any native vegetation removed to enable preparatory works forms part of the total extent of native vegetation removal necessary for the construction of the Project and native vegetation offsets must be provided in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP, 2017) except as otherwise agreed by the Secretary to DELWP.

5.0 EXPIRY

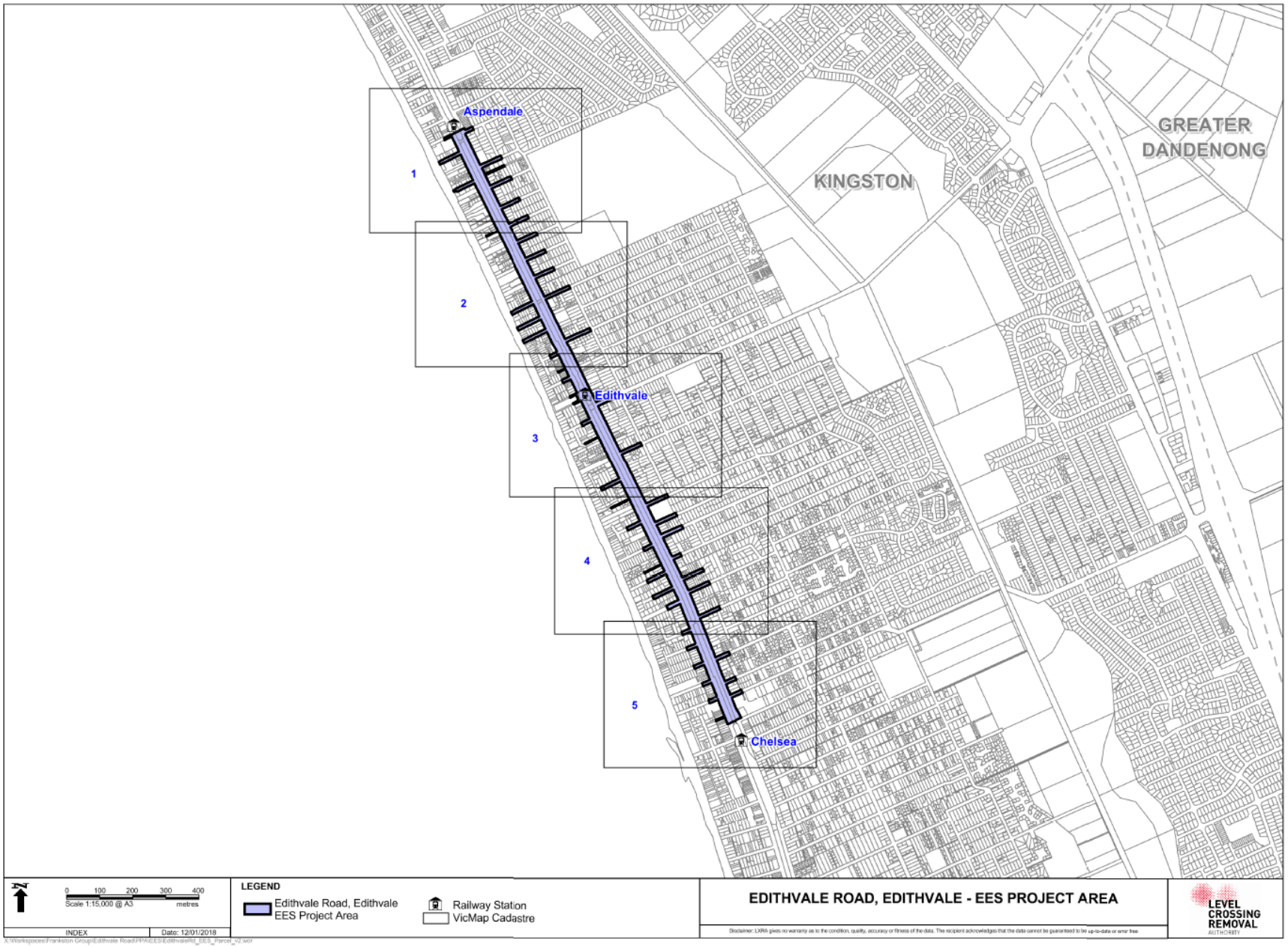
The controls in this document expire if any of the following circumstances apply:

- The development allowed by the controls, including preparatory works, is not started by 1 December 2020.
- The development allowed by the controls is not completed by 1 December

~~2025~~2030.

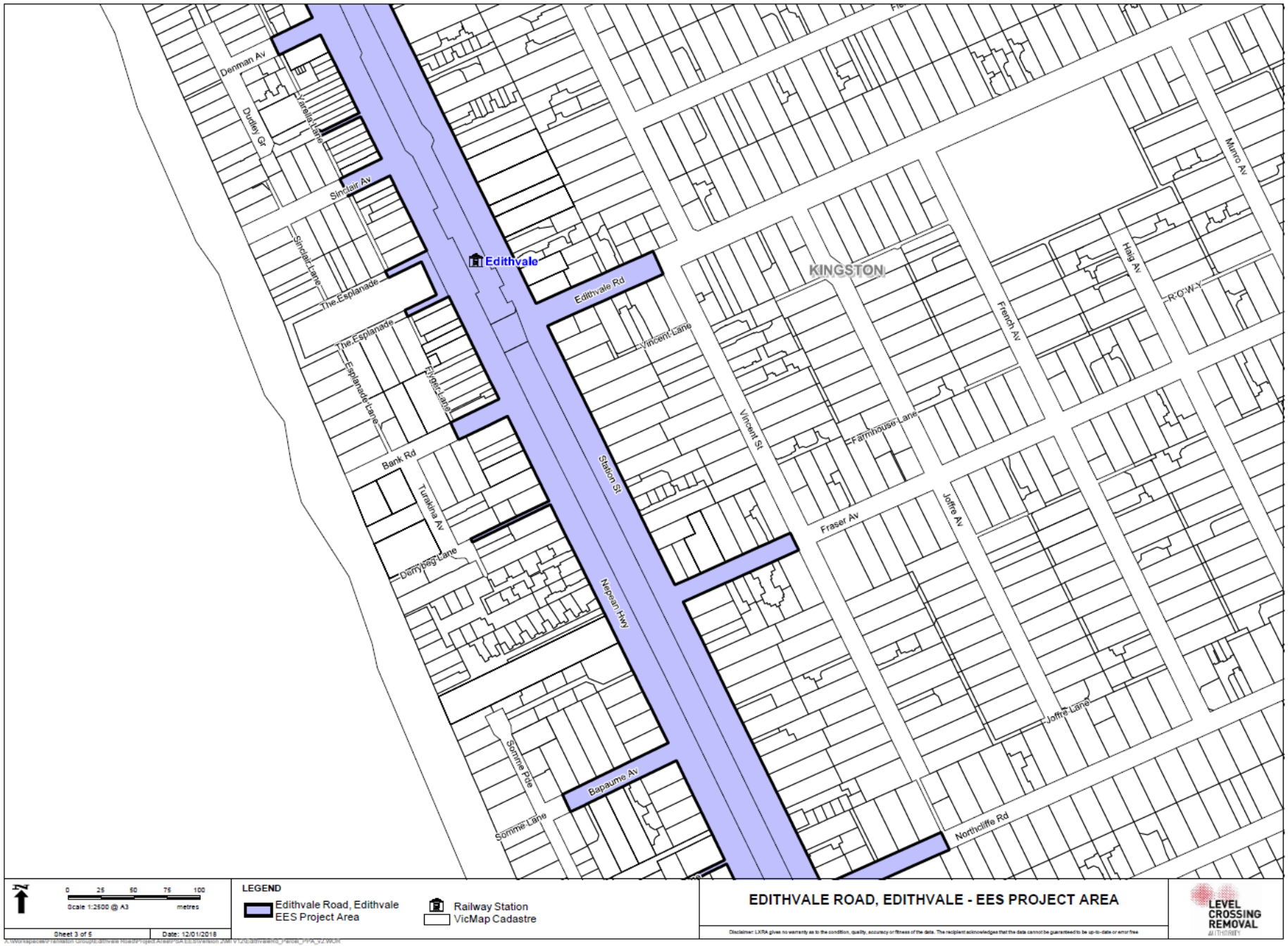
The Minister for Planning may extend these periods if a request is made in writing before the expiry date or within three months afterwards.

PROJECT AREA MAPS




Taylor Av
Station St
Lawrence Av
Lawrence Lane
Aspendale
Lincoln Pde
Foster St
Groves Lane
Foster Lane
Groves St
Roycroft Av
Duke St
Marshall Pl
KINGSTON
Albany Cr
Karringal Cr
Wongella Cr
Yackatoon Av
Leonard Av
Ross St
R.O.W.Y
Birdwood St
Gnotuk Av
Sixth Av
First Av
Second Av
Third Av
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 1 of 5
Date: 12/01/2018
LEGEND
Edithvale Road, Edithvale EES Project Area
Railway Station
VicMap Cadastre
EDITHVALE ROAD, EDITHVALE - EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY


KINGSTON
Third Av
Fourth Av
Fifth Av
Sixth Av
Park Rd
Park Lane
Nepean Hwy
Station St
Alexandra St
Natal Av
Carrington St
Waters Edge Pl
Denman Lane
Denman Av
Lochiel Av
Clydebank Rd
Rae Av
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 2 of 5
Date: 12/01/2018
LEGEND
Edithvale Road, Edithvale EES Project Area
Railway Station
VicMap Cadastre
EDITHVALE ROAD, EDITHVALE - EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY


Denman Av
Dudley Gr
Clarella Lane
Sinclair Av
Sinclair Lane
The Esplanade
The Esplanade
Esplanade Lane
Flinders Lane
Bank Rd
Tunakina Av
Derrybeg Lane
Edithvale
Edithvale Rd
Station St
Nepean Hwy
Somme Pde
Somme Lane
Bapaume Av
Vincent Lane
Vincent St
KINGSTON
Farmhouse Lane
French Av
Fraser Av
Joffre Av
Joffre Lane
Northcliffe Rd
Haig Av
R.O.W.Y
Munro Av
N
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 3 of 5
Date: 12/01/2018
LEGEND
Edithvale Road, Edithvale EES Project Area
Railway Station
VicMap Cadastre
EDITHVALE ROAD, EDITHVALE - EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY


Northcliffe Rd
Elliptic Lane
Bayside Av
Baker Av
Baker Lane East
Correa St
Niemann Lane
Cross Rd
Berry Av
Hazel Av
KINGSTON
Wallum Rd
Bristol Lane
Bristol Av
Nepean Hwy
Station St
Elsie Gr
Kangaroo Rd
Elsie Lane
Gracie Av
Craigie Av
Tarella Rd
Roseberry Av
Morton Gr
Armstrong Lane
Swanpool Av
Nevil Gr
Foy Av
Black St
Donald Lane
Foy Lane
Berwen Lane
R.C.Way
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 4 of 5
Date: 12/01/2018
LEGEND
Edithvale Road, Edithvale EES Project Area
Railway Station
VicMap Cadastre
EDITHVALE ROAD, EDITHVALE - EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY


Kelvin Gr
Berwen St
Barnes Gr
Douglas Av
Douglas Lane
Franklin Lane
Franklin Av
Nepean Hwy
Station St
Black St
Embankment Gr
Bertrand Rd
Drinan Rd
Swan Walk
Swan Lane
Thames Prom
Showers Av
Nicholson Lane
Avondale Av
Avondale Lane
Camp St
The Beachway
Beachway Lane
Bath St
The Strand
Chelsea Rd
KINGSTON
Blantyre Av
Chelsea Lane
Chelsea
Blantyre Lane
Catherine Av
Unnamed
Sherwood Av
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 5 of 5
Date: 12/01/2018
LEGEND
Edithvale Road, Edithvale EES Project Area
Railway Station
VicMap Cadastre
EDITHVALE ROAD, EDITHVALE - EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY

Station Street/Bondi Road, Bonbeach Level Crossing Removal Project

Incorporated Document

~~January~~ May **2018**

Incorporated document pursuant to section 6(2)(j) of the *Planning and Environment Act 1987*

1.0 INTRODUCTION

This document is an incorporated document in the Kingston Planning Scheme (**planning scheme**) and is made pursuant to section 6(2)(j) of the *Planning and Environment Act 1987*.

The land identified in Clause 3.0 of this document may be used and developed in accordance with the specific controls in Clause 4.0 of this document.

The control in this document prevails over any contrary or inconsistent provision in the planning scheme.

2.0 PURPOSE

The purpose of this incorporated document is to allow and facilitate the use and development of land described in clause 3.0 for the purposes of the Station Street/Bondi Road, Bonbeach Level Crossing Removal Project~~, including a railway, railway station, and associated upgrades to the road and rail network~~ (**Project**).

3.0 LAND

This ~~e control in this~~incorporated document applies to the land described as "Bondi Road/Station Street, Bonbeach - EES Project Area"~~required for the Project~~ as shown in the Project Area Maps forming part of this document (**Land**).

4.4 CONTROL

4.5 EXEMPTION FROM PLANNING SCHEME REQUIREMENTS

Despite any provision to the contrary, or any inconsistent provision, in the planning scheme, no planning permit is required for, and no planning provision in the planning scheme operates to prohibit, ~~or~~ restrict or regulate the use or development of the Land for the purposes of the Project.

The Project includes, but is not limited to, the following:

i) Removal of the level crossing at Station Street/Bondi Road, Bonbeach where it crosses the Frankston rail line.

j) Railway construction and associated works to lower the existing Frankston rail line under Station Street/Bondi Road, including, but not limited to, bulk excavation, relocation of existing utilities and installation of new utility infrastructure, earthworks, installation of drainage and retaining walls, replacement of track infrastructure, access tracks, landscaping, vegetation removal and construction and use of bicycle and pedestrian shared use paths.

k) Road construction and associated works including construction of a road bridge over the Frankston rail line at Station Street/Bondi Road and associated works including alterations to road access arrangements.

l) Development of a new railway station, including provision for the sale of food, drink and other convenience goods and services, decking over the trench, car parking, bicycle facilities and loading and unloading facilities.

m) Provision of pedestrian access and shared bicycle use paths, including the

construction of pedestrian bridges over the railway line.

n) Associated rail infrastructure, including power upgrades and overhead infrastructure, cabling and signaling.

o) Creation and alteration of access to roads.

p) Ancillary activities, preparatory and enabling works, including, but not limited to:

xii) Use and development of lay down areas for construction purposes.

xiii) Stockpiling of excavation material.

xiv) Use and development of temporary site workshops and storage, administration and amenities buildings, access and vehicle parking.

xv) Removal, destruction or lopping of trees and vegetation, including native vegetation and dead native vegetation.

xvi) Demolition and removal of buildings, structures and works.

xvii) Relocation, modification and upgrade of services and utilities.

xviii) Construction of fences, temporary site barriers and site security.

xix) Construction or carrying out works to create or alter roads, car parking areas, bunds, mounds, landscaping, excavate land, salvage artefacts and alter drainage.

xx) Earthworks including cutting, stockpiling and removal of spoil, and the formation of drainage works.

xxi) Display of construction, directional or identification signs.

xxii) Subdivision and consolidation of land.

4.6 CONDITIONS

The use and development permitted by this document must be undertaken in accordance with the following conditions:

Environmental Management Framework

4.6.1 Prior to the commencement of development (excluding preparatory buildings and works under clause 4.3), an Environmental Management Framework (EMF) must be approved by the Minister for Planning. The EMF must:

a) include the Environmental Performance Requirements applicable to the design, development and operation of the Project;

b) be prepared generally in accordance with the Environmental Management Framework contained in the Environment Effects Statement for the Edithvale and Bonbeach Level Crossing Removal Projects except where otherwise agreed to by the Minister for Planning including to give effect to the outcomes of the Minister's Assessment under the Environment Effects Act 1978.

~~The Project must be designed and constructed in accordance with the Edithvale and Bonbeach Level Crossing Removal Project EES Environmental Management Framework (EMF).~~

4.6.2 The EMF may be amended from time to time, to the satisfaction of the Minister for Planning.

4.6.3 The use and development must be carried out in accordance with the approved EMF.

Native Vegetation

4.6.4 Details of the proposed removal, destruction or lopping of native vegetation necessary for the construction of the Project must be prepared in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (Department of Environment, Land, Water and Planning, 2017) to the satisfaction of the Secretary to the Department of Environment, Land, Water and Planning (**DELWP**), except as otherwise agreed by the Secretary to DELWP.

4.6.5 Native vegetation offsets must be provided in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP, 2017), except as otherwise agreed by the Secretary to DELWP.

Heritage Management

4.6.6 Where, but for this incorporated document, a planning permit would be required for buildings and works or subdivision within a Heritage Overlay, site plans and elevations showing the extent of buildings and works must be prepared to the satisfaction of the Minister for Planning, except as otherwise agreed by the Minister for Planning.

4.6.7 Where, but for this incorporated document, a planning permit would be required for the demolition, alteration, or removal of a building within a Heritage Overlay, a full photographic survey of the buildings, comprising photographs of both the exterior and interiors of the buildings and contextual images of the buildings environs and their settings, must be prepared to the satisfaction of the Minister for Planning, except as otherwise agreed by the Minister for Planning.

Road Access

4.6.8 The creation and alteration of access to a road in a Road Zone Category 1 must be to the satisfaction of the Roads Corporation.

4.6.9 Subdivision of land adjacent to a road in a Road Zone Category 1 must be to the satisfaction of the Roads Corporation.

Other Conditions

4.6.10 Unless otherwise stated, the plans and other documents listed in Clause 4.2 must be approved prior to the commencement of works. Plans and other documents may be prepared and approved for separate components or stages of the Project but each plan or other document must be approved before commencement of works for that component or stage.

4.6.11 The plans and other documents may be amended from time to time to the satisfaction of the Minister for Planning or the relevant approving authority. In deciding whether a plan or other document is satisfactory or whether to consent to an amendment to a plan or other document, the Minister for Planning or the relevant approving authority may seek the views of council and any other

relevant authority.

4.6.12 The use and development of the Land must be undertaken generally in accordance with the approved plans and documents.

4.7 PREPARATORY AND OTHER WORKS

The following buildings and works and uses may commence on the Land prior to the approval of the plans and other documents listed in Clause 4.2:

c) Preparatory works for the Project including but not limited to:

i) Works, including vegetation removal, where but for this incorporated document, a planning permit would not be required under the provisions of the planning scheme.

ii) Investigation, testing and preparatory works to determine the suitability of land, and property condition surveys.

iii) Construction access points and working platforms.

iv) Site establishment works including temporary site fencing and hoarding, site offices, and hardstand and laydown areas.

v) Construction, protection, modification, removal or relocation of utility services, rail signaling, overhead and associated infrastructure.

vi) Establishment of environment and traffic controls, including designation of 'no-go' zones.

vii) Establishment of temporary car parking.

viii) Demolition to the minimum extent necessary, to enable preparatory works.

ix) Salvage and relocation of aboriginal cultural heritage material and other management actions in accordance with the relevant Cultural Heritage Management Plan approved under the *Aboriginal Heritage Act 2006* or otherwise in compliance with that Act.

d) The removal, destruction or lopping of native vegetation to the minimum extent necessary to enable preparatory works to the satisfaction of the Minister for Planning. Any native vegetation removed to enable preparatory works forms part of the total extent of native vegetation removal necessary for the construction of the Project and native vegetation offsets must be provided in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP, 2017) except as otherwise agreed by the Secretary to DELWP.

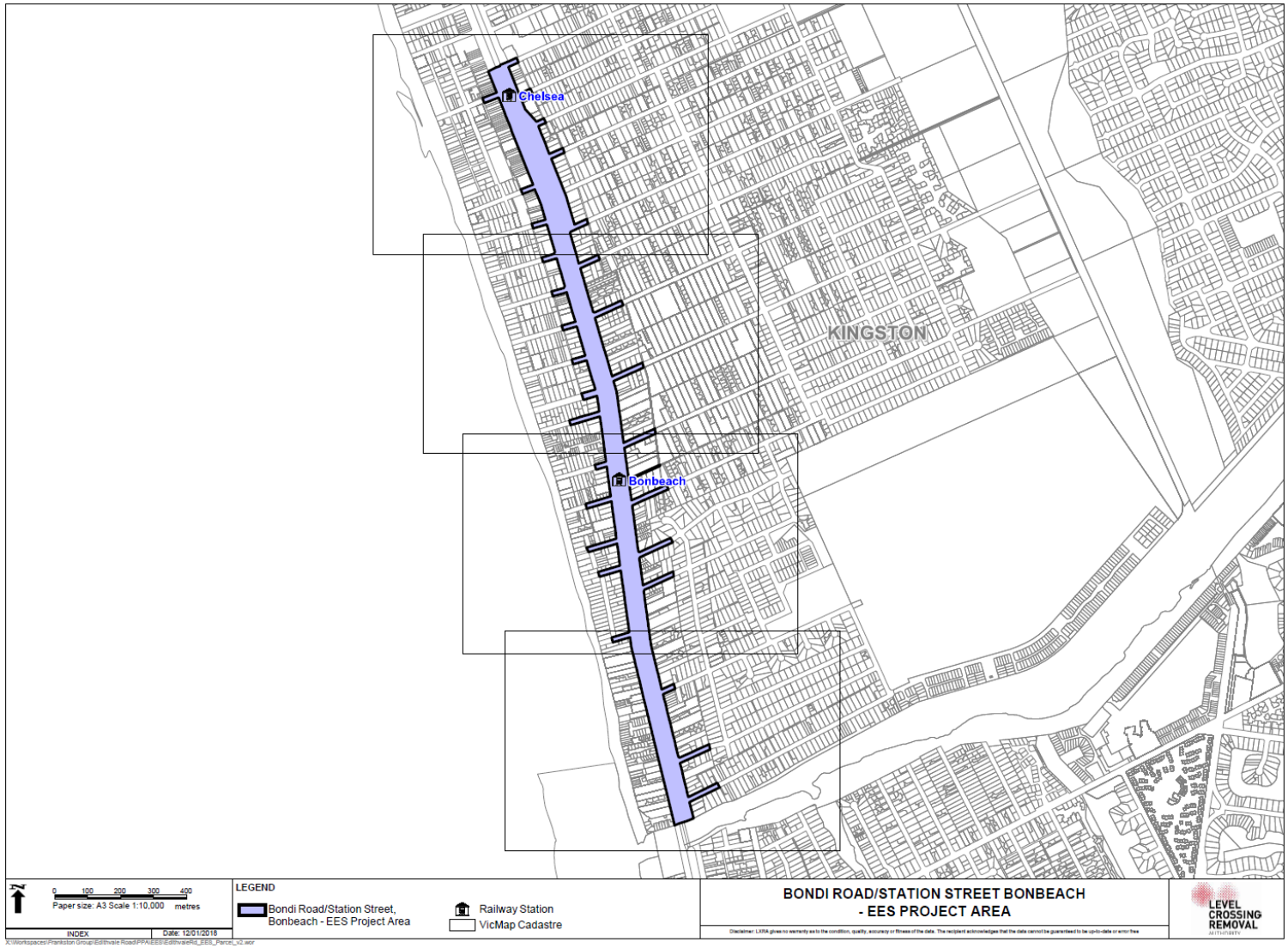
5.1 EXPIRY

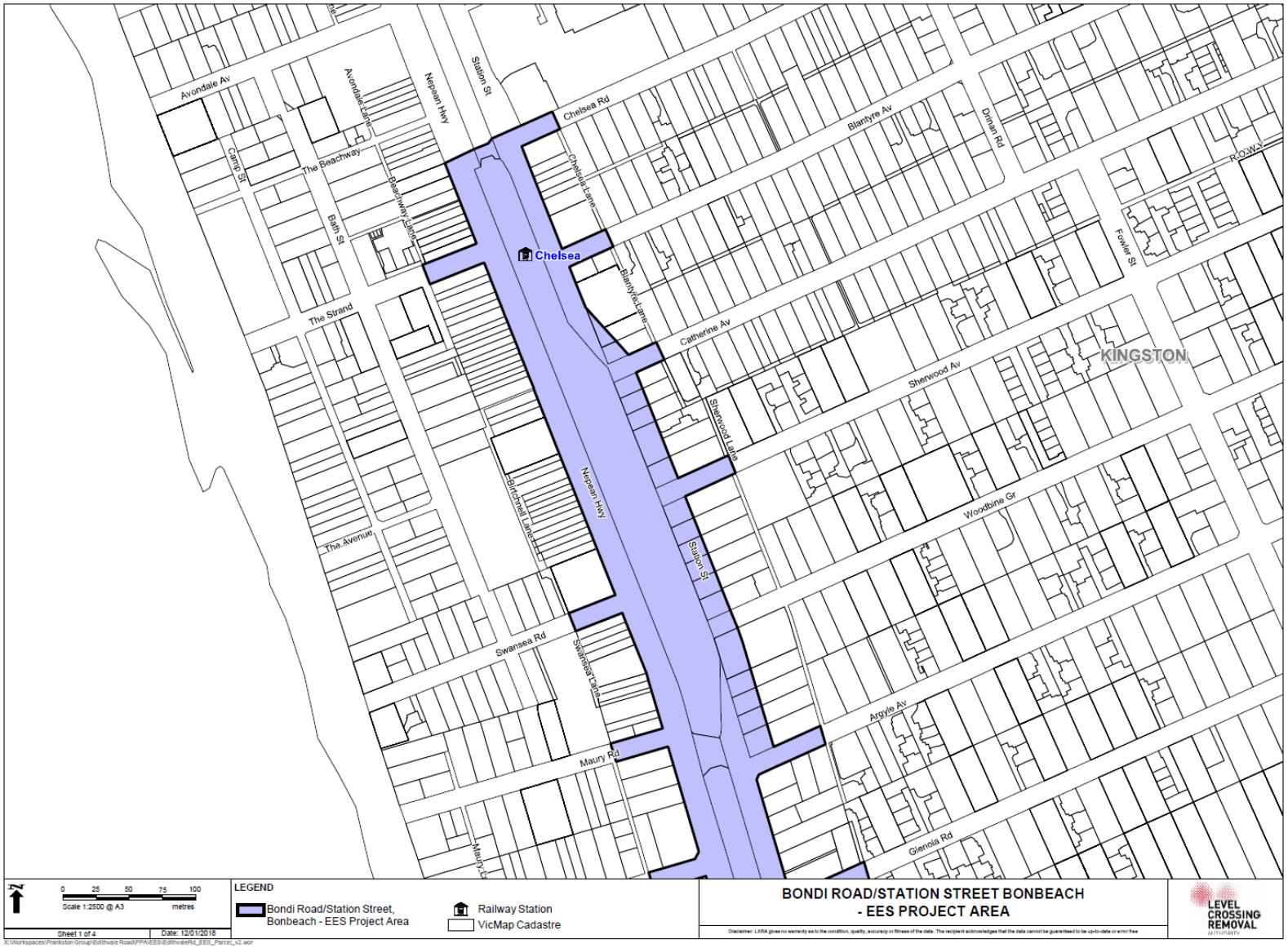
The controls in this document expire if any of the following circumstances apply:

- The development allowed by the controls, including preparatory works, are not started by 1 December 2020.
- The development allowed by the controls are not completed by 1 December ~~2025~~2030.

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

PROJECT AREA MAPS

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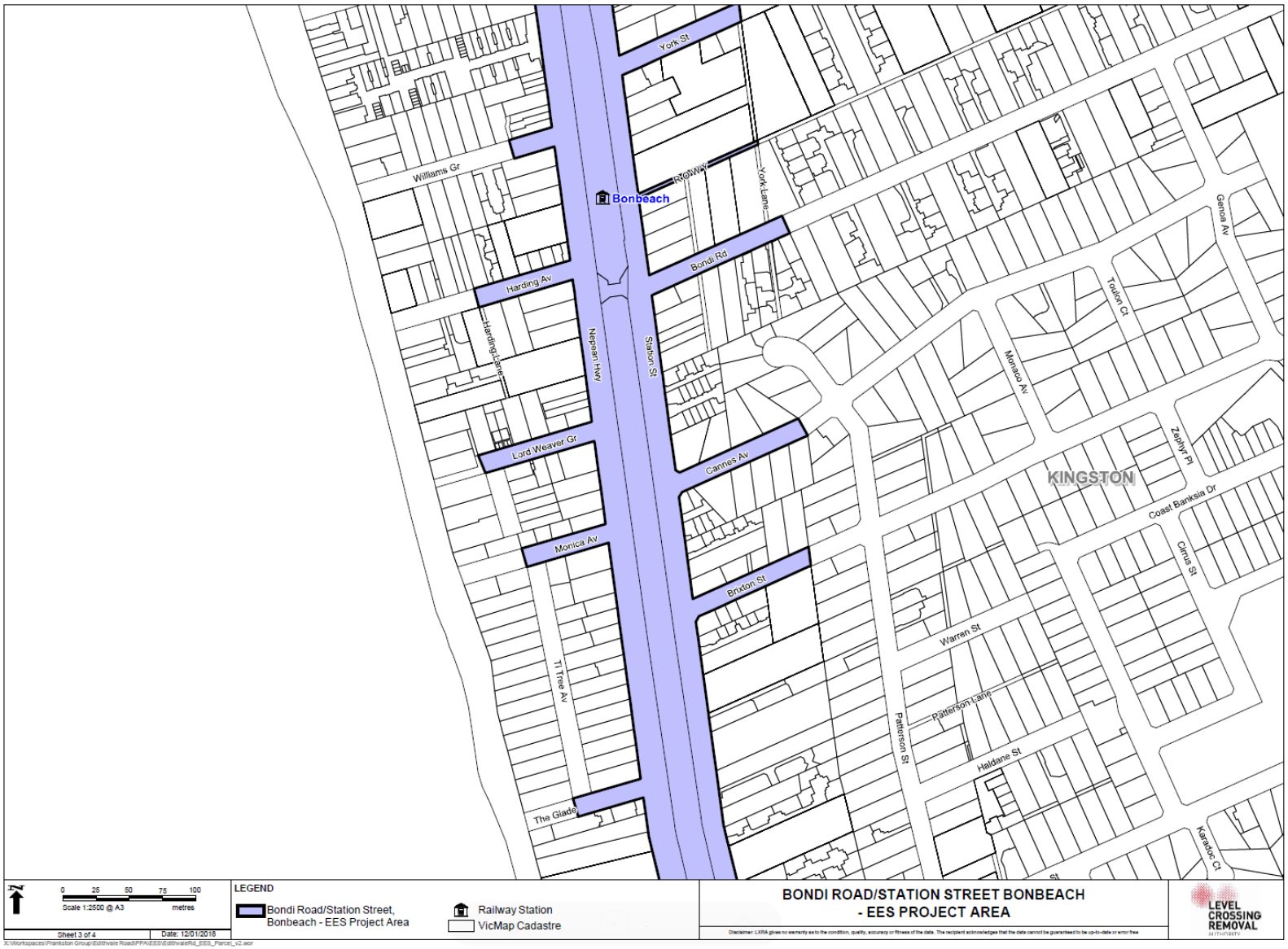
Dinan Rd
R.O.W.
Camp St
The Beachway
Beachway Lane
Bath St
Chelsea
Chelsea Lane
Blantyre Lane
Fowler St
The Strand
Catherine Av
KINGSTON
Sherwood Av
Sherwood Lane
Fairchnell Lane
Nepean Hwy
Woodbine Gr
The Avenue
Station St
Swansea Rd
Swansea Lane
Argyle Av
Maury Rd
Glenola Rd
Maury Ln
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 1 of 4
Date: 12/01/2018
LEGEND
Bondi Road/Station Street, Bonbeach - EES Project Area
Railway Station
VicMap Cadastre
BONDI ROAD/STATION STREET BONBEACH
- EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY


Glenola Rd
Glenola Lane
Mount Lane
Newington Pde
Newington Lane
Dartington Lane
Wimborne Av
Wimborne Lane
Nepean Hwy
Station St
Golden Av
KINGSTON
Chadwell Gr
Wynnie Lane
Broadway
Shenfield Av
Shenfield Lane
Wellwood Rd
Newberry Av
York St
Yorkstairs
0 25 50 75 100
Scale 1:2500 @ A3
metres
Sheet 2 of 4
Date: 12/01/2018
LEGEND
Bondi Road/Station Street, Bonbeach - EES Project Area
Railway Station
VicMap Cadastre
BONDI ROAD/STATION STREET BONBEACH
- EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY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Williams Gr
Bonbeach
ROW
York Lane
Bondi Rd
Harding Av
Harding Lane
Nepean Hwy
Station St
Lord Weaver Gr
Cannes Av
Monica Av
Brixton St
11 Tree Av
The Glade
Genoa Av
Toulon Ct
Monaco Av
Zephyr Pl
KINGSTON
Coast Banksia Dr
Citrus St
Warren St
Patterson Lane
Patterson St
Haldane St
Karatoc Ct
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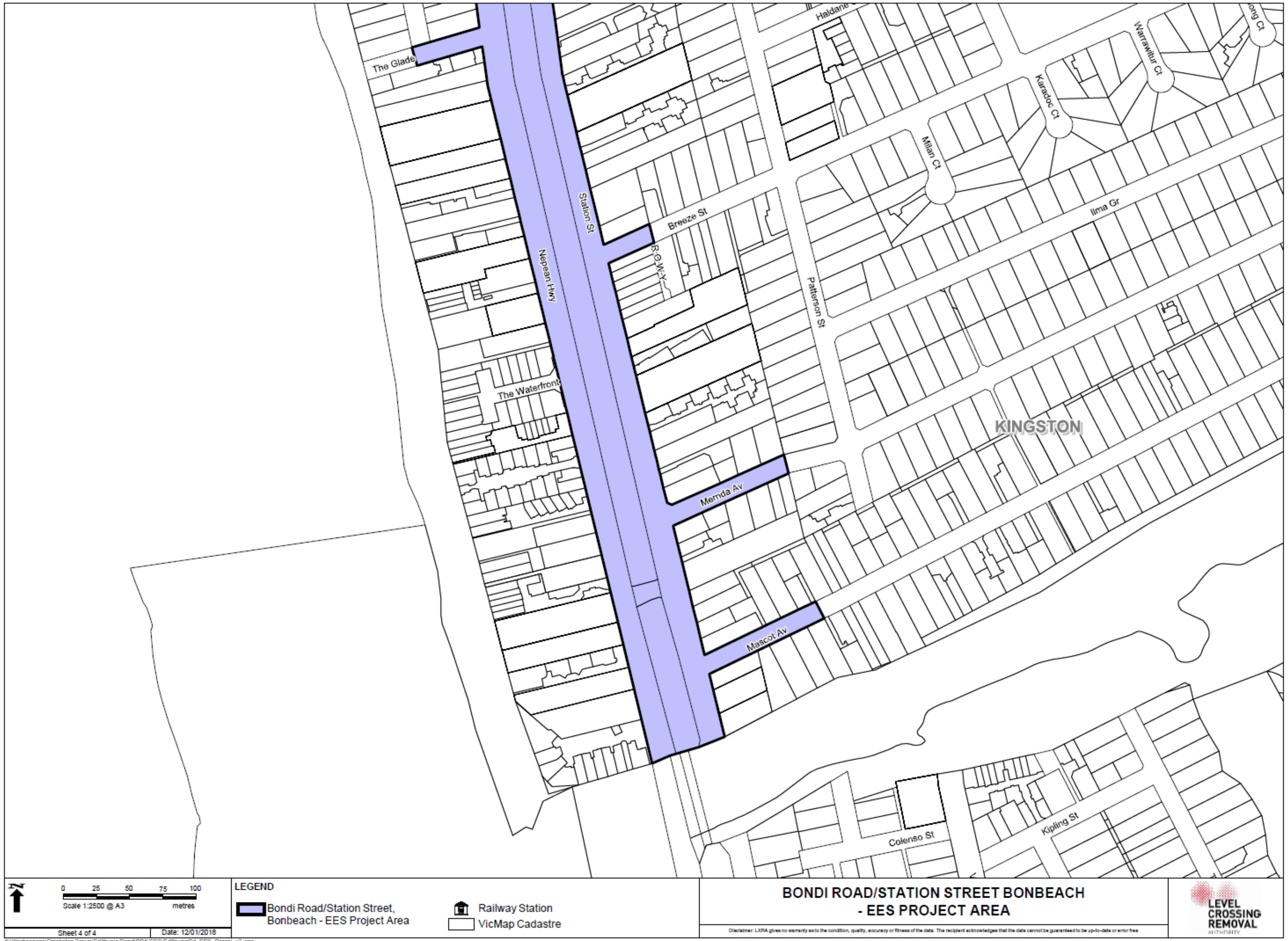
Scale 1:2500 @ A3
metres
Sheet 3 of 4
Date: 12/01/2018
LEGEND
Bondi Road/Station Street, Bonbeach - EES Project Area
Railway Station
VicMap Cadastre
BONDI ROAD/STATION STREET BONBEACH
- EES PROJECT AREA
LEVEL CROSSING REMOVAL AUTHORITY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Mascot Av
Haldane
Millan Ct
Karadoc Ct
Warrawitur Ct
Ilma Gr
KINGSTON
Colenso St
Kipling St
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Sheet 4 of 4
Date: 12/01/2018
LEGEND
Bondi Road/Station Street, Bonbeach - EES Project Area
Railway Station
VicMap Cadastre
BONDI ROAD/STATION STREET BONBEACH - EES PROJECT AREA
LEVEL CROSSING REMOVAL