

Edithvale and Bonbeach Level Crossing Removal Project

Inquiry and Advisory Committee

Expert Statement of Cameron Miller

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By



Cameron Miller

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1.0 Introduction

My firm (AECOM Australia Pty Ltd [AECOM]) prepared the technical reports titled Edithvale and Bonbeach Level Crossing Removal Projects Ecological Impact Assessment: Wetlands and Groundwater Dependent Ecosystems and Ecological Impact Assessment: Project Areas which are included as Technical Report B and D respectively to the Environment Effects Statement (EES) for the Edithvale and Bonbeach Level Crossing Removal Project (the project).

The role that I had in preparing the Technical Reports was to oversee the assessment and documentation of the existing ecological conditions and the impact assessment of the project and provide technical review and guidance. This included overseeing the completion of:

- desktop data extraction and analysis
- methods for field assessments
- analysis and reporting
- determination of impact pathways
- risk assessment (including taking part in the risk workshop).

I adopt Technical Report B and Technical Report D, in combination with this document, as my written expert evidence for the purposes of the Edithvale and Bonbeach Level Crossing Removal Project Inquiry and Advisory Committee's review of the EES and draft planning scheme amendments.

2.0 Qualifications and experience

Appendix A contains a statement setting out my qualifications and experience, and the other matters raised by Planning Panels Victoria 'Guide to Expert Evidence'.

A copy of my *curriculum vitae* is provided in Appendix B.

3.0 Technical Report findings

I adopt the findings of the following exhibited reports as part of my written expert evidence:

- Technical Report B Ecological Impact Assessment: Wetlands and Groundwater Dependent Ecosystems
- Technical Report D Ecological Impact Assessment: Project Areas.

For ease of reference, the key findings of the Technical Reports are summarised below.

3.1 Technical Report B – Ecology: Wetlands and GDEs

Technical Report B describes the existing ecological condition of wetlands and Groundwater Dependent Ecosystems (GDEs) within an area of interest which extends from the coast to approximately 2.5 kilometres inland. This area excludes the Edithvale and Bonbeach project areas which are the subject of EES Technical Report D Ecology: Project Areas. The study area was defined on the basis of the potential extent of groundwater change that was identified by preliminary groundwater modelling undertaken for the level crossing removal project and to incorporate the Edithvale Wetland section of the Edithvale-Seaford Wetland Ramsar site.

GDEs are defined by the *Guidelines for Groundwater licensing and the Protection of High Value Groundwater Dependent Ecosystems* (Victorian Government, 2015) as 'those ecosystems that require access to groundwater to meet all or some of their water requirements so as to maintain the communities of plants and animals and ecological processes they support, and ecosystem services they provide' (Victorian Government, 2015).

3.1.1 Existing conditions

A number of potential GDEs were identified as possibly occurring within the study area based on existing databases (BoM 2016; DELWP 2017a). These included two high value GDEs:

- Edithvale Wetland section of the Edithvale-Seaford Wetlands Ramsar site. Seaford Wetland is not considered by the report as it is greater than two kilometres south of the Bonbeach project area and is physically and hydrologically separated from Edithvale Wetland by Patterson River (created in 1876) and was not expected to be affected by the Edithvale or Bonbeach level crossing removals on this basis.

Edithvale Wetland supports remnants of vegetation and a diversity of habitats for a range of flora and fauna species. It provides potential habitat for significant flora species and is known to support a high diversity of significant birds including shorebirds listed under international migratory agreements and/or wetland-dependent birds listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Key species that are regularly supported by the site include Australasian Bittern, Sharp-tailed Sandpiper, Latham's Snipe and, to a lesser extent, Curlew Sandpiper.

- Wannarkladdin Wetlands are ecologically similar to Edithvale Wetland. The wetland cells range from a deeper pool surrounded by reed beds to shallow open water, bare soil or mud. The Wannarkladdin Wetlands provide habitat for a number of waterbirds and shorebirds and are part of a complex of wetlands (which includes the Edithvale-Seaford Wetlands) that are of national significance. Whilst classed as a high value GDE, Wannarkladdin Wetlands are not of the same ecological value as Edithvale Wetland. They are not managed specifically for conservation, have been subject to greater anthropogenic modification and public access is unrestricted.

Edithvale-Seaford Wetlands and Wannarkladdin Wetlands are remnants what was once the Carrum Carrum Swamp, an extensive, shallow, freshwater swamp that was largely drained in the late nineteenth century. These wetlands form part of the Carrum Key Biodiversity Area which is recognised for its significance for bird conservation.

Other GDEs identified within the study area are also described in the report. Generally these GDEs are not considered as ecologically significant as Edithvale Wetland and Wannarkladdin Wetlands, however, their collective contribution may be valuable at a landscape scale. For instance, Bicentennial Park and Centre Main Drain form a network of habitats and/or open space linking Wannarkladdin Wetland and Edithvale Wetland, and the corridor of vegetation along the Aspendale to Carrum Foreshore Reserve is likely to facilitate the movement of fauna through the area.

The Aspendale to Carrum Foreshore Reserve is a largely continuous linear strip of vegetation which is identified by the City of Kingston as a key natural resource area (areas that contain remnant indigenous vegetation). The reserve is comprised of three distinct Ecological Vegetation Classes (Coast Banksia Woodland, Coastal Dune Scrub and Coastal Dune Grassland) which support a diverse range of non-threatened flora and fauna.

3.1.2 Impact assessment

Constructing the railway line in a trench to remove the level crossings would result in changes to groundwater. Changes to groundwater as a result of the level crossing removal could have an impact on GDEs through:

- groundwater mounding changing water levels and/or water quality in GDEs inland of the project area
- groundwater drawdown changing water levels and/or water quality for GDEs on the bay side of the project area.

These changes were identified as having the potential to affect the ecological condition of the Edithvale-Seaford Wetlands Ramsar site, Wannarkladdin Wetlands and/or other vegetation and habitats that are reliant on groundwater, including native vegetation in the foreshore reserve. As such, the susceptibility of the Ramsar site and foreshore vegetation to hydrological and/or water quality changes was investigated in Technical Report B to inform the assessment of potential impacts on these areas of ecological value.

A summary of the impact assessment is provided below:

- The EES investigations followed an adaptive and iterative process whereby potential impacts identified by the technical investigations informed the development of design solutions to reduce those potential impacts.
- One of the key outcomes of this process was the establishment of an Environmental Performance Requirement (EPR) around groundwater performance outcomes for the project (EPR GW2). The EPR was developed in response to concerns around the potential for groundwater changes to result in ground waterlogging, ground subsidence, change in quality affecting beneficial uses or affecting the Edithvale Wetland. Groundwater modelling undertaken on the basis of achieving this EPR identified a reduction in the extent and magnitude of groundwater change resulting from the project, particularly at Edithvale.
- Groundwater modelling presented in EES Technical Report A does not predict any change to water levels, duration of inundation, rates of drawdown over summer and/or water quality within the Edithvale Wetland. Groundwater mounding of 0.1 metres is not modelled to extend (from the Edithvale level crossing project area) closer than approximately 1.1 kilometres from the western boundary of the Edithvale Wetland. As such, impacts on the extent of habitat and therefore on waterbird diversity and abundance, and impacts to its capacity to meet the Ramsar listing criteria would not occur as a result of the level crossing removal project at Edithvale and risk to the wetland is negligible.
- As a precaution, Environmental Performance Requirement (EPR) FF8 was developed for the project to prepare and fund a monitoring and mitigation plan for Edithvale Wetland to be implemented if the groundwater monitoring program identifies trigger levels for groundwater change have been reached (EPR GW3). The plan is to be developed in consultation with the Commonwealth Department of Environment and Energy, Victorian Department of Environment, Land, Water and Planning, and the land manager.
- Wannarladdin Wetlands are not expected to be impacted by groundwater change as they are located approximately 1400 metres from the area of inferred groundwater change associated with the Bonbeach level crossing removal.
- Groundwater modelling identified that groundwater drawdown could affect the Aspendale to Carrum Foreshore Reserve and therefore result in a risk to native vegetation located within this area:
 - Up to 0.9 hectares (ha) of native vegetation could be affected within the area of the Aspendale to Carrum Foreshore Reserve at Edithvale. The extent of native vegetation which may be affected by the Edithvale project is considered to represent a negligible risk.
 - Up to 1.6 ha of native vegetation within the Foreshore Reserve could be affected by groundwater change associated with the level crossing removal at Bonbeach. The extent of native vegetation which may be affected by groundwater drawdown represents a minor risk for the project at Bonbeach.
- A monitoring and mitigation plan for the foreshore native vegetation forms one of the EPR's (FF7) nominated for the Project. The plan is to be developed in consultation with the land manager and will be implemented if trigger levels for groundwater change are identified by the groundwater monitoring program (EPR GW3).

It is acknowledged that the implementation of a monitoring program does not mitigate the risk of the vegetation being lost, however it would inform whether changes in the condition and/or extent of vegetation were occurring and what, if any, contingency measures should be implemented to mitigate any impact.

Other ecological risks of the project

Construction works would also affect ecological values within the project areas. Impacts on those ecological values were considered in a separate report – EES Technical Report D Ecology: Project Areas (refer to Section 3.2).

Independent peer review

Technical Report B was subject to an independent peer review by Ecology Australia. The peer review concluded the following:

- The technical report provides a comprehensive analysis, considering other key reports and available datasets.
- The technical report provides adequate content to address the relevant scoping requirements for the EES.
- The peer reviewer agrees with the findings of the Technical Report that the risks to the native vegetation of the Aspendale to Carrum Foreshore Reserve associated with groundwater change are negligible for Edithvale level crossing removal and minor for the Bonbeach level crossing removal.

A number of items were identified by the peer reviewer for reconsideration by the AECOM-GHD JV during the drafting process. These were responded to with changes made to the draft technical report or a rationale provided for why changes were not made to the final draft.

3.2 Technical Report D – Ecology: Project Areas

Technical Report D addresses the potential impacts on ecological values within the level crossing removal project areas resulting from construction and operational activity.

3.2.1 Existing conditions

The Edithvale and Bonbeach project areas are located within a modified, urban environment. Vegetation and habitat is limited in extent and generally of poor quality. Despite this, 21 patches of native vegetation and three scattered trees were recorded within the level crossing removal project areas. These patches were comprised of two Ecological Vegetation Classes (EVCs) - Coast Banksia Woodland (EVC 2) and Coastal Dune Scrub (EVC 16). Coast Banksia Woodland has a Biodiversity Conservation Significance (BCS) of vulnerable in the Gippsland Plain Bioregion of Victoria. Coastal Dune Scrub has a BCS of depleted.

None of the native vegetation was considered to represent ecological communities listed as threatened under the EPBC Act and/or *Flora and Fauna Guarantee Act 1988* (FFG Act). Habitat within the project areas was considered unlikely to support flora or fauna species listed as threatened and/or migratory under the EPBC Act, listed under the FFG Act and/or as Victorian Rare or Threatened Species.

3.2.2 Impact assessment

Potential impacts of construction within project areas at Edithvale and Bonbeach were considered in conjunction with EPRs identified for the Project. Risks were considered in relation to potential impact pathways which included:

- Removal of native vegetation which would reduce the extent of native vegetation by more than one hectare. Applying the precautionary principle where all vegetation within the project areas would be lost until demonstrated otherwise, this loss equates to 2.2 ha of patches and four scattered trees. The extent of native vegetation which may be affected by the Edithvale and Bonbeach projects is considered to represent a minor risk.
- Loss of native flora listed as 'protected' under the FFG Act which would reduce the abundance of that species within the project area.
- Loss of habitat resulting in displacement, injury or death of non-threatened native wildlife protected under the *Wildlife Act 1975* which would have implications for individual animals of species that are common in the local area causing animal welfare concerns.
- Disturbance to fauna through an increase in noise, vibration and/or artificial light which may affect fauna behaviour resulting in a decline in fauna abundance and/or diversity within or adjacent to the project areas.
- Exacerbation of habitat fragmentation which is a 'potentially threatening process' under the FFG Act, although fragmentation of habitat within the broader rail corridor is a continuing issue and the consequence of further fragmentation is considered to be minor.
- Spread of weeds listed under the *Catchment and Land Protection Act 1994* (CaLP Act) resulting in the decline in quality of native vegetation in the rail corridor adjacent to the project area.

Technical Report D nominates measures to manage or mitigate impacts associated with construction include:

- Offsetting the removal of native vegetation.
- Obtaining a permit to remove protected flora species under the FFG Act
- Implementing measures to avoid, minimise or mitigate the:
 - spread or introduction of weeds or pathogens during construction
 - removal of habitat for fauna
 - disturbance of fauna
 - unintentional impacts on retained and/or adjacent vegetation and habitat.

EPRs identified for the project to address this are:

- EPR FF1 – Native vegetation and habitat - any native vegetation removal must be avoided, minimised and managed.
- EPR FF2 – *Flora and Fauna Guarantee Act 1988* permits - a permit to take and destroy flora species protected under the FFG Act is required.
- EPR 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.
- EPR 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*.
- EPR 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) including tree protection zones, environmental no-go zones, fencing and signage, directional lighting, and best practice spill, sedimentation and water runoff management.
- EPR FF6 – Landscaping for wildlife - Incorporate native plant species into landscaping that provide wildlife habitat within level crossing removal project areas where appropriate.
- EPR UD1 – Urban Design Guidelines - Design projects in accordance with the LXRA Urban Design Framework and project specific Urban Design Guidelines.

Construction within the project area is not expected to impact on:

- Matters of National Environmental Significance listed under the EPBC Act as threatened species are unlikely to occur and the Edithvale-Seaford Wetlands Ramsar site is not within, or immediately adjacent to, the project areas.
- Flora or fauna species or communities listed as threatened under the FFG Act as no communities are to occur and species have a low likelihood or are unlikely to occur in the project areas.

Other risks of the project

Constructing the railway line in a trench may result in changes to groundwater. The potential for these changes to impact on the ecological values GDEs has been considered in a separate report – refer to EES Technical Report B Ecological Impact Assessment: Wetlands and Groundwater Dependent Ecosystems (Section 3.1).

3.3 Matters of National Environmental Significance

In order to provide necessary commentary on the likelihood of significant impacts specific to Matters of National Environmental Significance (MNES) protected under the EPBC Act, the Technical Reports included separate sections to consolidate the discussion and provide an assessment of the potential mechanisms through which impact on those matters, as a result of the level crossing removal projects at Edithvale and Bonbeach, could have been realised.

The MNES relevant to the Edithvale and Bonbeach level crossing removals are:

- listed and threatened species
- migratory species protected under international agreements
- Wetlands of International Importance (Ramsar sites).

Below is a summary of the MNES of relevance to the project and their likelihood of occurrence within the project areas and the broader GDE study area. Also included below is a summary of the evaluation that no significant impact on a MNES is likely as a result of the project.

3.3.1 Existing conditions

Listed threatened species

Project areas

No species listed under the EPBC Act are considered to have a moderate or above likelihood of occurrence in the project areas.

GDE study area

Two flora species and five fauna species listed as threatened under the EPBC Act are considered to have at least a moderate likelihood of occurrence within the GDE study area:

- River Swamp Wallaby-grass
- Swamp Everlasting
- Australasian Bittern
- Curlew Sandpiper (also listed as migratory)
- Bar-tailed Godwit (also listed as migratory)
- Australian Painted Snipe
- Grey-headed Flying-fox.

With the sole exception of Grey-headed Flying Fox, which may forage in the area on an occasional and opportunistic basis, no listed threatened species are considered likely to occur outside of the high value habitat provided by Edithvale Wetland and Wannarkladdin Wetlands.

The project areas are typically devoid of foraging trees for Grey-headed Flying-Fox and the species is considered to have a low likelihood of occurrence.

Listed migratory species

Project areas

The project areas are not considered to provide habitat for listed migratory species.

GDE study area

A total of 20 bird species listed as migratory under the EPBC Act are considered to have at least moderate likelihood of occurrence within the broader GDE study area. This determination is supported by formal bird surveys completed by Birdlife Australia (ongoing since 1987) at Edithvale Wetland and Wannarkladdin Wetlands, and data from the VBA and PMST.

BirdLife Australia data has been relied upon for the discussion of potential impacts of the project, and given the temporal scale and regularity of these surveys, additional site-based assessment is unlikely to contribute any additional information of significance to this assessment.

Migratory species considered to make the most significant use of suitable habitats within the GDE study area are:

- Sharp-tailed Sandpiper
- Latham's Snipe.

Other species listed as migratory under the EPBC Act that are considered to have at least a moderate likelihood of occurrence include wader species such as egrets, predominately aerial species such as Fork-tailed Swift, and other migratory shorebird species recorded less frequently such as Common Sandpiper and Curlew Sandpiper. Curlew Sandpiper is also listed as threatened under the EPBC Act.

A number of habitats for listed migratory species occur within the study area. Core habitat is provided by the Edithvale Wetland. Wannarkladdin Wetlands provide additional habitat for migratory shorebirds. Less favourable habitat is provided by the vegetation along the northern bank of the Patterson River, anthropogenic waterbodies within golf courses and the Centre Main Drain. These areas provide low quality habitat and may be visited by migratory species on an occasional and opportunistic basis. They do not represent significant or important habitat for migratory species.

Ramsar wetlands

Project areas

No declared Ramsar wetlands occur within the project areas.

GDE study area

The Edithvale Wetland section of the Edithvale-Seaford Wetlands Ramsar Site occurs within the GDE study area. It is located approximately 1.3 kilometres east of the Edithvale project area and approximately 2 kilometres north-east of the Bonbeach project area.

Edithvale Wetland supports a diversity of habitat for a range of flora and fauna species. It provides potential habitat for significant flora species and is known to support a high diversity of significant birds including shorebirds listed under international migratory agreements and wetland-dependent birds listed under the EPBC Act. Edithvale Wetland is described in detail in Technical Report B.

The Seaford Wetland section of the Ramsar site is hydrologically and hydrogeologically separated from Edithvale Wetland by the Patterson River. Seaford Wetland will not be impacted by the project and, as such, is not discussed in Technical Report B.

3.3.2 Significant impact assessment

The project areas are not considered to support MNES. The project is considered unlikely to result in a significant impact to a MNES listed within the broader GDE study area.

Potential mechanisms of impact on MNES considered in the impact assessment included groundwater change, noise and vibration, acid sulfate soils and contamination (including waste production), dust and air quality, surface water change and sedimentation, light spill. These mechanisms would be associated with works undertaken within the project areas but, as no MNES are considered to be supported by the project areas, it was the potential for them to have an indirect impact on MNES beyond the project footprint which was the primary concern of the project.

It is unlikely that works undertaken within the project areas will have a significant impact on MNES. This is based on:

- the absence of suitable habitat for threatened and/or migratory species immediately adjacent to the project areas
- the distance of high value GDEs which are known to support threatened and/or migratory species from the project areas

- the discussion provided in Technical Report D Section 9 in relation to groundwater change and quality, and noise and vibration, which are considered to represent the mechanisms with the greater potential to affect MNES within the study area considered in this technical report.

3.4 Key assumptions and limitations

The findings of the Technical Reports are subject to the following assumptions and limitations:

- AECOM has relied upon third party data such as that supplied by DELWP and BirdLife Australia.
- Groundwater modelling and the associated interpretation of results presented in EES Technical Report A was relied upon for determining risks and impacts of the project. Evaluating the accuracy of the model was not within the scope of the ecological impact assessment. The ecological impact assessment has not sought to verify the results presented in EES Technical Report A.
- Assessments of GDEs on private land and golf courses were undertaken from the closest publically accessible vantage points and with reference to aerial imagery. No private land was accessed.
- Native vegetation of the Aspendale to Carrum Foreshore Reserve was mapped from Roycroft Avenue to Bristol, Edithvale and from Shelfield Avenue to Mernda Avenue, Bonbeach. These sections were identified as areas of interest based on preliminary groundwater modelling.
- The need for targeted survey for threatened and/or migratory species was considered for those species identified by the investigation as having moderate or greater likelihood of occurrence in the study area.
- Targeted surveys for threatened bird species were not undertaken as the survey effort completed by BirdLife Australia was considered sufficient for determining species status in the GDE study area.
- With the exception of Dwarf Galaxias, targeted survey was not undertaken for other threatened species. Habitat requirements were compared to existing conditions of the study area and a precautionary approach taken to their likelihood of occurrence.
- No targeted surveys for threatened flora or fauna species were deemed necessary for the Edithvale or Bonbeach project areas as no suitable habitat was identified during detailed field investigations (i.e. vegetation mapping).
- The extent of field survey and information available from other sources were considered adequate for the purpose of identifying potential impacts from the project on ecological values.
- The literature review as it pertains to the Edithvale-Seaford Wetland was not intended to be an exhaustive synthesis of current knowledge, but rather provide a concise and consolidated account of the ecological values supported, or predicted to be supported, by these ecosystems.
- Given the ecological values of the Edithvale Wetland have been well documented, it was not the role of Technical Report B to provide a comprehensive description of the site. Instead, it summarised the conservation values, existing ecological values and threats to these values presented by the level crossing removal project.
- For the purposes of this impact assessment, it is assumed that all vegetation (planted and indigenous) would be lost where it falls within the construction area for the project. This determination has been made as vegetation would be subject to direct impact (loss) from construction, soil compaction and potential root damage, as well as reduced availability of water and potential increased shading.
- Given the lack of certainty in published scientific research and government guidelines in relation to the reliance of vegetation on groundwater, it was assumed for the purpose of the risk and impact assessment that the native vegetation of the Aspendale to Carrum Foreshore Reserve draws on groundwater. The degree of its reliance on groundwater was unable to be definitely determined and as such the precautionary principle was applied and it was assumed that all vegetation within the modelled area of influence of groundwater change could be lost.

- Mapping of native vegetation (patches and scattered trees) was conducted using hand-held Trimble PDA units and aerial photo interpretation. The accuracy of the mapping is subject to the accuracy of the unit, access to satellite information (generally < 5 metres) and environmental conditions at the time of assessment (i.e. cloud cover).
- The residual risks determined for the Level Crossing Removal Project are subject to the implementation of the EPRs nominated by the Project.
- The groundwater and ecological impact assessments were interdependent as the results of a number of investigations completed for each discipline informed the other. As a consequence, not all of the ecological investigations outlined in Technical Report B were ultimately relevant to discuss within the ecological impact assessment, particularly once the predictions of the groundwater modelling were known (EES Technical Report A).
- Identification of GDEs for consideration in the assessment is based the National Atlas of Groundwater Dependent Ecosystems administered by the Australian Government Bureau of Meteorology (BOM) and Potential Groundwater Dependent Ecosystem Mapping for the PPWCMA administered by the Department of Environment, Land, Water and Planning (DELWP). The accuracy of the GDE mapping in each of the databases (BoM 216; DELWP 2017a) is variable and likely dependent on the accuracy of input data. Technical Report B does not seek to verify the accuracy of modelling or provide an indication of the level of groundwater dependence of a potential GDE as this was beyond the scope of works.
- Technical Report B and Technical Report D were prepared on the basis of the project description provided to the AECOM-GHD JV by LXRA.
- The opinions, conclusions and any recommendations in Technical Report B and Technical Report D are based on site conditions encountered and information reviewed at the date of preparation of the documents. Site conditions or scientific understanding may change after the date of the documents.

3.5 Scoping requirements

The Technical Reports were prepared to address the Scoping Requirements issued by the Minister for Planning for the EES. These scoping requirements are provided in Section 2. of Technical Report B and Technical Report D.

4.0 Further work since preparation of the Technical Reports

Since Technical Report B and Technical Report D were finalised, I have not undertaken any further work in relation to the matters addressed in the Technical Reports relevant to the Project.

5.0 Written Submissions

5.1 Submissions received

I have read the public submissions to the EES and draft planning scheme amendments and identified those that are relevant to Technical Report B and Technical Report D and/or my area of expertise:

- 1
- 8
- 85
- 213
- 235
- 3
- 25
- 98
- 216
- 242
- 6
- 28
- 147
- 226

Several submissions make reference in part to aspects of ecological values. They are outlined in the summary of submissions below in order, however, I have resolved that they do not require further consideration as they are not directly relevant to Technical Report B or Technical Report D or my area of expertise.

The remaining submissions in my opinion are not relevant to Technical Report B or Technical Report D or my area of expertise.

Most of the submissions were in favour of the rail under road solution – no Sky Rail. Many of those submissions referred to the conclusions of the EES that no impacts on the wetlands are likely in expressing their view that the rail under road solution should be adopted and that environmental impacts do not present an impediment to its implementation. Several submissions make statements on ecological topics as further justification for no elevated rail. In my opinion these submissions do not require me to make a response; despite their statements relevant to my area of expertise as they are being made in support of the rail under road solution and are therefore not issues to be addressed in this context.

A number of submissions included positive feedback on the rigour of the EES investigations and agreed with the findings of the EES.

5.2 Summary of issues raised

The submissions have raised the following issues relevant to my area of expertise:

- One submission (1) raises a concern in relation to groundwater change an impact on 'what we have left of bush in the rail corridors'.
- One submission (3) provides details on the history of the local area and the railway line. The submitter considers it important to acknowledge the 'important role of the environmental factors in the railway history and development' in relation to the Edithvale-Seaford Wetlands and effect on railway route and narrow reservation and the number of visitors they attract. The submission reiterates that 'as stated in the report, they [wetlands] should be protected at all costs from impacts from the project and their role in the environment enhanced at all times'. In my opinion, this concern relates to the history of the railway line and not ecological matters. As such, this submission is not considered further in my expert report.
- One submission (6) suggests an elevated rail is a hazard to migratory birds in support of a no elevated rail preference. In my opinion this submission is not raising a concern in relation to the rail under road solution or the findings of Technical Report B or Technical Report D.
- One submission (8) acknowledges that while there appears the trench would have no adverse impact on the Edithvale-Seaford Wetlands due to alterations to water table, if there is a remote chance of any impact on the wetland then an elevated option should be adopted. It states there must be absolutely no chance of any adverse impact on the wetlands as a result of the level crossing removals at Edithvale and Bonbeach.

- One submission (25) is primarily concerned about 'our precious Edithvale Wetlands' and questioned whether it was worth the risk even if the EES concludes the trench would not impact the wetlands as the findings could be wrong. The submission proposes that rail over road be implemented for Edithvale and rail under road at Bonbeach.
- One submission (28) requested that any vegetation and planting utilise indigenous species as exotic species tend to escape and invade the foreshore.
- One submission (85) mentions birds in relation to making an argument for no sky rail. In my opinion this submission is not raising a concern in relation to the rail under road solution or the findings of Technical Report B or Technical Report D.
- One submission (98) in support of the rail under road is adamant about maintaining the health of the wetlands and considers it clear upon reading the EES that a rail under road solution is possible without damaging the wetlands.
- One submission (147) is in support of the proposed trenching of the railway line subject to no impact on the local natural environment. The area of primary concern is the vegetation of the foreshore reserve, particularly the Bonbeach foreshore. The submission requests more detail in relation to mitigation measures that will be adopted if groundwater drawdown affects the survival of the foreshore vegetation.
- One submission (216) raised concerns in relation to whether the project will exacerbate pre-existing adverse impacts of existing urbanisation and infrastructure of water tables in and flows to Port Phillip Bay. An area of particular interest and a topic expanded upon in the submission is the concern of the effect on seagrass in Port Phillip Bay.
- The detailed submission (213) from the Friends of Edithvale-Seafood Wetlands (FESWI) makes the following points:
 - FESWI made a submission because of their concern about the potential effects of the proposed trench in altering flows of groundwater and consequently having a negative impact on the wetlands.
 - FESWI provide background to the process and acknowledge that:
 - The 'GHD report...re-established an understanding of the contemporary groundwater system'.
 - Initial groundwater modelling and risk assessment identified the risk of groundwater change affecting the wetlands as too high.
 - Mitigation of impacts were proposed through a change to the design which was then refined to further reduce the risk.
 - Figure 25 of Technical Report B depicts the net outcome of the groundwater management approach and shows minimal impact inland.
 - FESWI state that 'the report is silent on any independent review of the groundwater modelling and the mitigation measures proposed'. The preceding sentence to this statement refers to Technical Report B so my interpretation is that this statement is referring to that report.
 - FESWI state that 'it' (again my interpretation is this is referring to Technical Report B) needs to be clear how impacts are to be monitored and who will be responsible for this work in the long term. Additional mitigation measures that might need to be taken if there is an adverse effect also need to be made clear.
 - FESWI indicate that these are the areas of concern and that models are 'always open to variability and have limitations'. It is on this basis that FESWI consider that the actual outcome needs to be monitored in order to verify the modelling.
 - FESWI conclude that:
 - Long term monitoring is extremely important

- Recommend that monitoring of groundwater is assessed and reported in a transparent and public manner.
- Further mitigation strategies should be explored as early as possible.
- It is important the Edithvale-Seaford Wetlands be maintained for the flora and fauna and for the enjoyment of future generations.
- The detailed submission from Kingston City Council (226) makes the following points:
 - Council are satisfied with the rigour of the investigations undertaken for the EES.
 - Council consider that the project satisfactorily addresses the risks outlined in the scoping requirements for the project.
 - Council agrees there is unlikely to be impacts on the Ramsar site.
 - Although Council have no significant concerns with the findings of the EES, Council requires further assurances and agreements to be provided, particularly in relation to accountabilities for the EPRs. Council provides the following recommendations of particular relevance to Technical Report B or Technical Report D:
 - Long term accountabilities – given the significance of the coastal vegetation, Council requests greater clarity in relation to ongoing monitoring and reporting, particularly in identifying who is accountable for identifying any changes in groundwater and how this will be reported. Establishment of the handover process and long term arrangements up front is requested to ensure the risks resulting from the project remain low. Council recommends that a table be included in the Environmental Management System for the project to clearly identify key plans, responsibility for their preparation and which legal entity must approve the plan/s.
 - Vegetation and urban design – Council recommends that station design and landscaping should consider resilience in a climate change future and provide in depth consultation about landscaping and vegetation replacement during design.
 - Items Council consider were not addressed in the EES of relevance to ecology included:
 - Urban heat and visual amenity risks through the loss of vegetation and natural ground in the project areas.
- The detailed submission (235) from Port Phillip Conservation Council Inc. makes the following points:
 - Concerned about the trench construction at Edithvale threatens the integrity of the Edithvale-Seaford Wetlands and the Bonbeach grade separation potentially threatens the survival of remnant Coast Banksia Woodland on the Bonbeach foreshore.
 - Concerned that the flow patterns and flow directions of groundwater may be altered.
 - Consider it is critical that the wetlands are maintained as an 'irreplaceable environmental asset, both for the enjoyment of future generations of humans and the flora and fauna reliant on it'.
 - Port Phillip Conservation Council provide background to the process and acknowledge that:
 - The 'recent GHD report...re-established an understanding of the contemporary groundwater system'
 - Initial risk assessment identified the risk of groundwater change affecting the wetlands as too high.
 - Mitigation of impacts were proposed through design which was then refined to further reduce the risk.
 - Port Phillip Conservation Council remain concerned about what already happens when the area floods. They suggest that during flood events Melbourne Water sends sewerage into the waterways.

- Port Phillip Conservation Council state that ‘the GHD report is silent on any independent review of the groundwater modelling [sic] and the mitigation measures proposed’. The preceding sentence to this statement refers to Technical Report B so my interpretation is that this statement is referring to that report.
- The submission outlines a lesson from the past in relation to Melbourne Water engineering activities in the context that they had the ‘harmful unintentional consequences’ that, had they been known, Melbourne Water would not have proceeded. The statement assumes that ‘Melbourne Water was as confident as LXRA now is that their purchased “independent experts” advice on proposed improvements would not have any harmful unintentional consequences’.
- The Bonbeach Coast Banksia Woodland includes the ‘last of the pre-settlement old banksias on the Kingston foreshore and is the best and most extensive actively recruiting remnant of this vegetation community type on the Eastern shores of Port Phillip Bay.
- LXRA officers presenting at community briefings appeared to have little understanding of whether groundwater changes would impact the Coast Banksia Woodland and suggested ‘they’ hope that as there is currently seasonal variation a bit more won’t matter. The submission also refers to the suggestions made by LXRA officers that irrigation of the foreshore or planting of drought-tolerant plants were being considered if groundwater change did impact the foreshore vegetation.
- ‘Monitoring impacts after the event then coming up with various piecemeal responses to a critical issue is not really the scientific, moral or ethical approach surely?’
- LXRA or State Government has not produced a credible Plan B to respond and remediate if the wetlands or Coast Banksia Woodland are damaged by the project.
- Modelling of environmental impacts has a long history of failing to predict the consequences of various projects. The submission provides the example of the channel deepening by Port of Melbourne Corporation.
- The submission states that ‘the preservation and rehabilitation of our natural environment must take priority over “hard” engineering’
- The Sky Rail option would be the ‘least worst outcome for this area’
- The submission concludes that if the panel cannot be sure there will be no risk at all from the trenching option then they should not approve the project.
- The detailed submission from Kingston Residents Association (242) makes the following points:
 - The precautionary principle should ‘rigorously reserved; because the trench construction at Edithvale potentially threatens the integrity of the Edithvale-Seaford Wetlands and trench construction at Bonbeach potentially threatens the survival of the remnant Coast Banksia Woodland, particularly the ‘last giant pre-settlement banksia’.
 - The suitability of irrigation of the foreshore reserve or planting with drought tolerant plants.
 - The principal concern is that there is no fall back option if the modelling turns out to be wrong and Edithvale Wetlands and the Bonbeach Coastal Banksia Woodland (foreshore reserve) are damaged.
 - Modelling is still an imperfect science.
 - If the EES panel cannot be sure there will be no risk at all they should not approve this project.
 - Question the political motivations for trench rather than elevated rail
 - States there is no risk to the wetlands from elevated rail construction. Also states that migratory birds would not be impacted by the Sky Rail.
 - Suggests the submission may be broadened at panel to cover more specific issues, including the need to assess how the trench will interact with the existing threat of climate

change and rising sea levels, particularly the risk of saltwater encroachment in relation to Edithvale Wetland and Bonbeach foreshore reserve.

In summary, the issues raised by these submissions which I consider warrant a response are the statements/concerns that:

1. groundwater change could impact on remaining bush in the rail corridors
2. the Edithvale-Seafood Wetlands should be protected and their health maintained
3. a precautionary approach should be applied unless can be sure there will be no risk as modelling may be inaccurate
4. Technical Report B is silent on any independent review of the groundwater modelling and the mitigation measures proposed
5. water flow will change which, in particular, may affect seagrass in Port Phillip Bay
6. more detail is required in relation to ongoing monitoring and reporting, accountability and also mitigation of impacts on the vegetation of the Aspendale to Carrum Foreshore Reserve
7. EES did not consider urban heat and visual amenity risks through the loss of vegetation and natural ground in the project areas
8. station design and landscaping should consider resilience in a climate change future and provide in depth consultation about landscaping and vegetation replacement during design
9. need to assess how the impact of the trench with interact with existing threat of climate change and rising sea levels, particularly the risk of saltwater encroachment in relation to Edithvale Wetland and Bonbeach foreshore reserve
10. invasion of the foreshore reserve from landscaping for the project.
11. the suitability of irrigation of the foreshore reserve or planting with drought tolerant plants.

5.3 Response to issues raised

Set out below are my comments and response to the issues raised by the written submissions relevant to the area of my expertise.

Issue 1: groundwater change could impact on remaining bush in the rail corridors

Our report has been developed on the assumption that all indigenous vegetation will be lost. However, opportunities to minimise loss and retain vegetation will be implemented during detailed design (if available). As such, it is likely there is limited vegetation within the rail corridor that could interact with groundwater. In addition, vegetation in the rail corridor beyond the project areas is unlikely to be influenced by groundwater change. Groundwater change is not predicted by the modelling presented in Technical Report A to extend beyond the Edithvale and Bonbeach level crossing removal project areas (ie north or south of the project areas).

Issue 2: the Edithvale-Seafood Wetlands should be protected and their health maintained

The primary driver for the EES was concern in relation to the protection of the Edithvale-Seafood Wetlands.

The findings of the EES indicate that the wetlands are unlikely to be impacted by the rail under road construction approach. EPRs have been designed to provide further confidence in this conclusion.

Issue 3: a precautionary approach should be applied unless the panel can be sure there will be no risk as modelling may be inaccurate

Accuracy of the groundwater modelling is discussed in Technical Report A – Groundwater.

The findings of the groundwater modelling indicate that the wetlands are unlikely to be impacted by the rail under road solution.

We recognise the value of the Edithvale Wetland and foreshore reserve, and also recognise the concern that the modelling may be inaccurate.

In recognition of the need to apply a precautionary approach to the potential for impacts (on vegetation in the foreshore reserve in particular) EPRs have been formulated for the project to monitor and identify mitigation measures to be implemented in the event groundwater change does not align with the model predictions or vegetation of the foreshore reserve is affected in a manner attributable to groundwater change. These EPRs are – EPR GW3 groundwater monitoring plan, EPR FF7 monitoring and mitigation plan (Aspendale to Carrum Foreshore Reserve), EPR FF8 monitoring and mitigation plan (Edithvale Wetland). These monitoring plans are to be prepared in consultation with relevant stakeholders and will therefore be subject to a rigorous review process as a result.

Issue 4: Technical Report B is silent on any independent review of the groundwater modelling and the mitigation measures proposed.

The submissions from FESWI and Port Phillip Conservation Council are focused on a review of Technical Report B and do not appear to refer to Technical Report A – Groundwater. Technical Report B draws upon the outputs of the groundwater modelling, and it is outside the scope of Technical Report B and not within my area of expertise to review or comment on the groundwater modelling. It is noted that an independent peer review of the groundwater modelling was undertaken and is appended as Annexure I to Technical Report A. I also note that mitigation measures will be identified as part of implementing EPR GW2 – Groundwater management and monitoring plan. These mitigation measures will be devised to be implemented in the event that groundwater change does not align with the model.

Issue 5: Exacerbation of impacts from existing urbanisation on water tables and flows to Port Phillip Bay and the potential impacts on seagrass.

Water tables and flows and the potential for the project to exacerbate any negative affects this could have on Port Phillip Bay is not my area of expertise and as such I cannot provide an opinion as to the merit of this concern. However, I can comment in relation to seagrasses in the vicinity of the project areas.

Seagrass meadows within Port Phillip Bay primarily occur in areas protected from prevailing westerly winds and longshore scouring associated with sand movement. The eastern shore of Port Phillip Bay is typically too exposed and hydrodynamically active to facilitate seagrass establishment/persistence which is reflected in the seagrass distribution in Jenkins and Keough (2015).

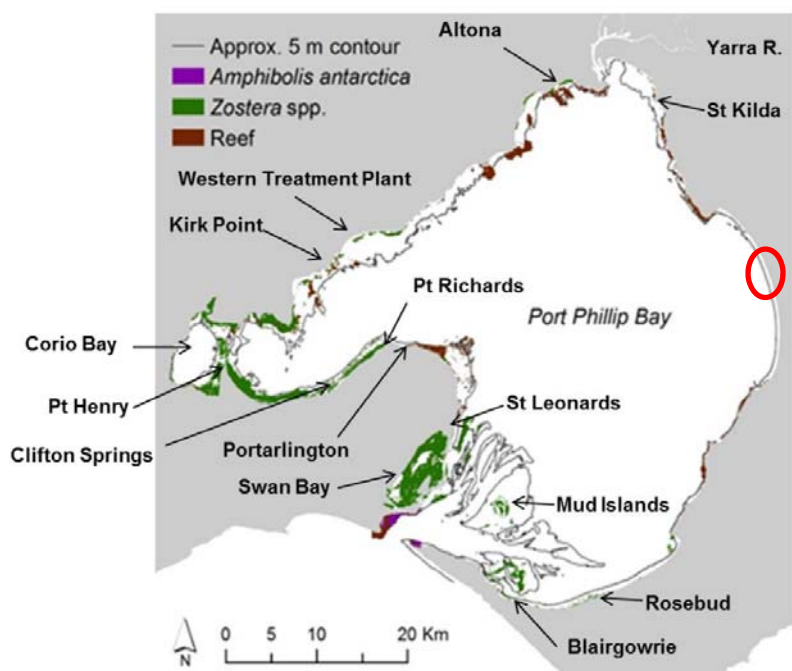


Figure 1 Seagrass distribution in Port Phillip Bay, 2000.

In my opinion, the hydrodynamic conditions reduce the extent and density of any seagrass meadows on the eastern shoreline of Port Phillip Bay. As such, any seagrass which may occur in the vicinity of the project areas is unlikely to be extensive and therefore unlikely to make a significant contribution to the overall extent of seagrass in Port Phillip Bay. Furthermore, even if it can be established that changes to water tables or flows will occur, they are unlikely to pose a significant risk to seagrass in Port Phillip Bay.

Issue 6: More detail is required in relation to ongoing monitoring and reporting, accountability and also mitigation of impacts on the vegetation of the Aspendale to Carrum Foreshore Reserve.

The project intends to resolve and provide this detail as part of preparing and implementing EPR FF7, the GDE monitoring and mitigation plan for the Aspendale to Carrum Foreshore Reserve. The monitoring and mitigation plan will be developed at a later stage in the project cycle.

In my opinion the implementation of a monitoring program does not mitigate the risk of the native vegetation being lost. However, monitoring would inform whether changes in the condition and/or extent of native vegetation were occurring which is the means by which any impact would be able to be detected and in the absence of a definitive understanding of the reliance of the foreshore vegetation on groundwater. Development of the monitoring and mitigation plan will facilitate the identification of contingency measures to be implemented to mitigate any impact such a change in the extent and/or condition of vegetation be detected within the foreshore reserve.

Issue 7: EES did not consider urban heat and visual amenity risks through the loss of vegetation and natural ground in the project areas

Whilst this concern refers in part to the loss of vegetation, consideration of urban heat and visual amenity risk was outside the scope of the ecological investigation..

Issue 8: Station design and landscaping should consider resilience in a climate change future and provide in depth consultation about landscaping and vegetation replacement during design.

This issue of landscaping for resilience to climate change is outside the scope of the ecological investigation.

If I interpret 'vegetation replacement' as referring to offsets then my response to this is 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 with the project area. Landscaping would not form part of offsets for native vegetation.

Issue 9: need to assess how the trench interacts with the threat of climate change and rising sea levels, particularly the risk of saltwater encroachment in relation to Edithvale Wetland and Bonbeach foreshore reserve.

Technical Report B/risk assessment identified a risk pathway of exacerbating the effect of sea level rise predicted in response to climate change on the wetlands and a risk pathway around saline intrusion in the groundwater as a result of drawdown which may affect the foreshore vegetation.

The risk of exacerbating the effect of sea level risk was found to be negligible on the basis of the groundwater modelling not predicting groundwater change that poses a risk to the wetland. My understanding is that climate change was factored into the hydrological model presented in Technical Report A - Groundwater.

Saline intrusion relies upon the findings of Technical Report A – Groundwater which predicts change in the salinity of groundwater as a result of the project is not expected to exceed that required for potable water to be of beneficial use. In other words, groundwater salinity will not exceed acceptable levels of human drinking water.

Groundwater impacts are not predicted to occur within the wetlands. However, the assessment in Technical Report B sought to determine the potential impacts of saline intrusion on ecological function of the Edithvale Wetland (specifically as an overwintering location for migratory shorebirds). This was done through survey of macroinvertebrate assemblages that are likely to provide the food source for migratory birds and consideration of the salinity tolerance of the vegetation in the wetland. The

macroinvertebrate community was identified to be highly tolerant of salinity (refer to Section 5.3.10.1 of Technical Report B) and thus saline intrusion is not thought to be a risk to the wetlands in the context of their capacity to provide food for migratory shorebirds. The macrophyte vegetation in the wetland was also found to be tolerant of saline conditions (refer to Section 5.3.1 of Technical Report B). Migratory shorebirds are found in many highly saline and significant environments including the Western Treatment Plant at Werribee and the former Cheetham Saltworks at Point Cook.

Issue 10: Invasion of the foreshore reserve from landscaping for the project

EPR FF6 (landscaping for wildlife) has been established with the intent to incorporate native plant species into landscape to provide habitat for wildlife.

To my knowledge there are no proposals for planting within the foreshore reserve involving the use of exotic species.

Issue 11: The suitability of irrigation of the foreshore reserve or planting with drought tolerant plants..

These suggestions were not made by the ecology expert or in Technical Report B or D. In my opinion locally indigenous, coastal vegetation is already salt tolerant and only species consistent with the EVCs already present in the foreshore reserve should be planted. FF7

6.0 Environmental Performance Requirements & Conclusion

A number of EPRs are proposed in relation to minimising and/or mitigating impacts on ecological values. The project EPRs were developed in an iterative fashion whereby the risk assessment identified initial impact pathways and risks for all aspects of the project, the EPRs were refined to address those risks where possible. A final (residual) risk was then defined for the project for each of the impact pathways identified.

Of particular note in this regard was development of EPR GW2 – Groundwater performance outcomes to identify groundwater targets that the project must meet in order to lower the likelihood of impacts occurring and further reduce the risks associated with groundwater change, particularly in relation to waterlogging of properties, ground subsidence, changes to water quality affecting beneficial uses and the Edithvale Wetland.

EPRs developed in relation to ecological elements are:

- EPR FF1 – Native vegetation and habitat - any native vegetation removal must be avoided, minimised and managed
- EPR FF2 – Flora and Fauna Guarantee Act 1988 permits - a permit to take and destroy flora species protected under the FFG 1988 is required.
- EPR 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.
- EPR 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*.
- EPR 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) including tree protection zones, environmental no-go zones, fencing and signage, directional lighting, and best practice spill, sedimentation and water runoff management.
- EPR FF6 – Landscaping for wildlife - Incorporate native plant species into landscaping that provide wildlife habitat within level crossing removal project areas where appropriate.
- EPR FF7 – Groundwater dependent ecosystem monitoring and mitigation plan (foreshore native vegetation) - Prepare and fund the implementation of a Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Foreshore Native Vegetation) in consultation with the land manager.
- EPR FF8 – Groundwater dependent ecosystem monitoring and mitigation plan (Edithvale Wetland) - Prepare and fund the implementation of a Groundwater Dependent Ecosystem Monitoring and Mitigation Plan (Edithvale Wetland) in consultation with the Department of Environment and Energy (DoEE), Department of Environment, Land, Water and Planning (DELWP), and the land manager.
- EPR UD1 – Urban Design Guidelines - Design projects in accordance with the LXRA Urban Design Framework and project specific Urban Design Guidelines.
- EPR 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.
- EPR GW2 – Groundwater performance outcomes - The tanked rail trenches at Edithvale and Bonbeach must be designed to ensure that changes to ground water levels as a result of the projects do not result in:
 - groundwater mounding that increase water logging at ground level
 - groundwater drawdown that could cause ground subsidence and adverse impact to subsurface structures

- degradation to groundwater quality that would preclude protected beneficial uses of groundwater (salinity, contaminants, coastal acid sulfate soils)
- changes to groundwater that would have significant impacts on groundwater dependent ecosystems.
- EPR GW3 – Groundwater management plan - Prepare and fund the implementation of a Groundwater Management and Monitoring Plan to the satisfaction of the EPA and relevant water authorities to manage predicted and potential impacts to groundwater following construction of the piled trench walls

I am satisfied that these EPRs appropriately minimise and mitigate impacts of the project on the ecological values identified. I am satisfied the EPRs adequately address the concerns raised in the submissions.

I agree with the acknowledgement in Technical Report B that the implementation of a monitoring program does not mitigate the risk of the vegetation being lost. However monitoring would inform whether changes in the condition and/or extent of vegetation were occurring and what contingency measures should be implemented to mitigate any impact.

7.0 Declaration

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



Cameron Miller

Dated 24 May 2018

Appendix A – Matters Raised by guide to expert Evidence

A. Name and address of expert

Name: Cameron J Miller

Address: Collins Square, Level 10, Tower Two,
727 Collins Street, Melbourne, VIC 3008

B. Qualifications and Experience of Expert

- a. My name is Cameron Miller and I am an Associate Director – Ecology at AECOM Australia Pty Ltd (AECOM). I also hold the title of National Practice Leader, Natural Resources with AECOM.
- b. I completed a Bachelor of Science at the University of Melbourne in 1992 and a Masters of Science (Ecology and Management) at the University of Adelaide in 1996. I am also currently enrolled in the Graduate Certification of Arboriculture (University of Melbourne) and have partially completed this course.
- c. Refer to Appendix B for copy of my curriculum vitae.

C. Experts area of expertise to make the report

- a. For the past 19 years I have been employed as an ecologist in the capacity as a consultant or working for government agencies such as Parks Victoria and the Environment Protection Authority (Victoria). In my current role I act as the National Practice Leader, Natural Resources. I also have a technical role and have expertise in:
 - Flora and fauna surveys
 - Fauna habitat mapping and assessment
 - Environmental impact assessment
 - Habitat hectare analysis
 - Ecological planning advice, State and Federal referrals
 - Experimental design and analysis.

D. Other significant contributors to the report

A number of staff assisted with this project including:

- Christopher White;
- Sally Koehler; and
- Jonathan Billington.

Their qualifications are summarised below.

Christopher White

Christopher holds a Bachelor of Environmental Science degree (1st Class Honours) from Monash University 2007. He is currently completing a PhD assessing the impact of human disturbance and climatic variation on vegetation succession within the western plains of Victoria. Chris is a member of the Ecological Society of Australia, the Environment Institute of Australia and New Zealand and the Wildlife Society.

Chris is DELWP habitat hectares accredited (2009-2016) and an accredited tree climber with aerial rescue.

Chris has been a consultant ecologist for over 12 years and a senior project manager for the past five. He has extensive experience in the design and implementation of ecological survey throughout Australia's temperate and semi-arid zone environments. Chris has provided specialist ecological advice for a range of major projects including both the Hume Highway Tarcutta Bypass and the Hume Highway duplication project in southern New South Wales, the expansion of Melbourne's Urban Growth Boundary on behalf of the Growth Areas Authority, Melbourne Water's Waterways Alliance, and the Geelong Saltworks Urban Renewal Project. His involvement in key infrastructure and development projects in NSW and Victoria demanded an in-depth understanding of the application of both state and national biodiversity policy, and refined skills in stakeholder engagement and client management.

Complementing Chris' ecological impact assessment experience is his expertise and training in the application of Geographic Information Systems to ecological theory and practice.

Sally Koehler

Sally holds a Bachelor of Applied Science degree in Environmental Management and a Bachelor of Science (Honours) gained from Deakin University in 1997. Sally is a member of the Ecological Society of Australia, BirdLife Australia, Australasian Bat Society, Field Naturalists Club of Victoria and is a member of the Australasian Network for Ecology and Transportation.

Sally has been a consultant ecologist for over 17 years and has been co-ordinating and conducting fauna survey and habitat assessments throughout south-eastern Australia for over 20 years. Her experience includes targeted surveys for threatened flora and fauna species (particularly Growling Grass Frog, Striped Legless Lizard and Golden Sun Moth, Matted Flax-lily, Spiny Rice- flower), development of threatened fauna management plans, threatened species salvage, environmental impact assessment and wildlife habitat assessment.

She has participated in and managed fauna habitat assessments, targeted fauna survey and ecological impact assessments for a wide range of projects including residential and commercial developments and major infrastructure projects such as the Level Crossings Removal Program, Long-term Containment Facility, Hazelwood Mine – West Field Project, Basslink interconnector, Southern Gas Pipeline, Portland Windfarm and Shepparton Bypass.

Sally has been extensively involved in the systematic search and recovery of the nationally threatened Striped Legless Lizard *Delma impar* and, most recently, managed a major translocation and mark-recapture study of a population of the nationally threatened Growling Grass Frog *Litoria raniformis* including contributing to the design of habitat for the species.

Jonathan Billington

Jonathan holds a Bachelor of Science degree with majors in zoology and genetics, gained from Monash University 2007.

Jonathan is an ecologist with over eight years consulting experience, working across multiple disciplines for a wide range of clients.

Jonathan has experience in a wide range of ecological investigations including desktop studies, due diligence assessments, general and targeted flora and fauna assessments and aquatic surveys. Jonathan has been involved in the preparation of a wide variety of reports including construction management, ecological improvement and offset management plans. As part of his role with AECOM, Jonathan has led negotiations with DELWP's Bush Broker, landholders and clients to obtain suitable offset sites for developments within and beyond Melbourne's growth boundary. Jonathan also has an integral role in organising and conducting field based investigations.

During his past eight years working at AECOM Jonathan has worked together with a wide variety of clients to assess the potential ecological impacts of projects. Client experience includes Department of Defence, Department of Transport, VicRoads, VicTrack, The Victorian Desalination Plant, local government and a range of residential property developers.

E. Scope of the report

I have been requested by Clayton Utz on behalf of the Level Crossing Removal Authority to undertake the following work:

1. Review the public submissions referred to me to the extent relevant to my area of expertise.
2. Prepare an expert report that:
 - a. responds to the public submissions relevant to my area of expertise;
 - b. addresses my Previous Reports and any changes required arising out of the issues raised in the public submissions; and
 - c. addresses any other matter that I consider relevant to my area of expertise.
3. Prepare a short power point presentation for presenting at the hearing
4. Attend the hearing to give evidence in relation to my reports.

F. Person who carried out tests or experiments upon which the expert relied

- Groundwater modelling report (Technical Report A).

I have assumed that all submissions relevant to my area of expertise have been allocated to me.

G. Abbreviations and glossary

The following abbreviations and terms are used throughout this statement.

Abbreviation	Definition
BIOR	Biodiversity Impact and Offset Report
BoM	Bureau of Meteorology
DBH	Diameter at breast height
DoEE	Department of Environment and Energy
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Environment and Primary Industries (now DELWP)
EEA	Environmental Effects Act 1978
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EPR	Environmental Performance Requirement
EVC	Ecological Vegetation Class
FFG Act	Flora and Fauna Guarantee Act 1988
FIS	Flora Information System
GDE	Groundwater Dependent Ecosystem
Hha	Habitat hectares
HZ	Habitat zone
MLTV tree	Medium – Long Term Viability tree
NMLTV tree	Non Medium – Long Term Viability tree
NVIM	Native Vegetation Information Management
PMST	Protected Matters Search Tool
PPWCMA	Port Phillip and Westernport Catchment Management Authority
VROTS	Victorian rare or threatened species
VBA	The Victorian Biodiversity Atlas

H. References

My expert evidence report has been prepared with reference to the following documents:

AECOM-GHD JV (2018a). Edithvale and Bonbeach Level Crossing Removal Projects Environment Effects Statement - EES Technical Report B Ecological Impact Assessment: Wetlands and Groundwater Dependent Ecosystems. Produced by the AECOM-GHD Joint Venture for the Level Crossings Removal Authority.

AECOM-GHD JV (2018b). Edithvale and Bonbeach Level Crossing Removal Projects Environment Effects Statement - EES Technical Report D Ecological Impact Assessment: Project Areas. Produced by the AECOM-GHD Joint Venture for the Level Crossings Removal Authority.

BoM (2016). National Atlas of Groundwater Dependent Ecosystems. Administered by the Australian Government Bureau of Meteorology. Available at:
<http://www.bom.gov.au/water/groundwater/gde/index.shtml> [Accessed 22 June 2017]

DELWP (2017a). Potential Groundwater Dependent Ecosystem (GDE) Mapping for the Port Phillip and Westernport CMA. Administered by the Department of Environment, Land, Water and Planning. Available at <https://www.data.vic.gov.au/data/dataset/potential-groundwater-dependent-ecosystem-gde-mapping-for-the-port-phillip-and-westernport-cma> [Accessed on 1 June 2017]

DELWP (2017b). Guidelines for the removal, destruction or lopping of native vegetation – December 2017. Department of Environment, Land, Water and Planning, East Melbourne, Victoria.

Jenkins, G. and Keough, M. (2015). Seagrass Resilience in Port Phillip Bay Final Report to the Seagrass and Reefs Program for Port Phillip Bay. Final Report to the Seagrass and Reefs Program for Port Phillip Bay. Prepared by the University of Melbourne. Available at:
http://www.pir.sa.gov.au/__data/assets/pdf_file/0004/265585/Seagrass_Resilience_in_Port_Phillip_Bay.pdf

Victorian Government (2015). Ministerial Guidelines for Groundwater Licensing and the Protection of High Value Groundwater Dependent Ecosystems. Issued by the Hon Lis Neville MP, Minister for Environment, Climate Change and Water on 13 April 2015. Available at:
<https://waterregister.vic.gov.au/images/documents/Guidelines%20for%20Groundwater%20Licensing%20and%20the%20Protection%20of%20High%20Value%20Groundwater%20Dependent%20Ecosystems.pdf>

Appendix B – *Curriculum vitae*

Cameron Miller

Associate Director - Ecology



Qualifications

Bachelor of Science, 1992 (Melbourne University)
 Masters of Science - Ecology & Management, 1996 (University of Adelaide)
 Graduate Certificate in Arboriculture, in progress (Melbourne University)

Affiliations

- Member of the Environment Institute of Australia and New Zealand
- Member of the Ecological Society of Australia
- Member Box-Ironbark Farm Forestry Network (BIFFN) and hardwood plantation grower
- Former president Australian Marine Conservation Society (AMCS): Victorian branch

Publications and Technical Papers

Campbell, SJ and Miller, CJH (2002). Shoot and abundance characteristics of the seagrass *Heterozostera tasmanica* in the Westernport estuary (south-eastern Australia). *Aquatic Botany* 73(1) 2002. pp 33-46.

Campbell, SJ, Miller, CJH, Steven, A, & Stephens, A (2003). Photosynthetic response of two temperate seagrasses across a water quality gradient using chlorophyll fluorescence. *Journal of Experimental Marine Biology and Ecology* 291 2003. pp 57-78.

Carey, JM, Burgman, MA, Miller, C and Chee, YE (2005). An application of qualitative risk assessment in park management. *Australian Journal of Environmental Management* 12 (2005). pp 6-15.

Miller, CJH, Campbell, SJ and Scudds, S (2005). Spatial variation of *Zostera tasmanica* across an environmental gradient in south-eastern Australia. *Marine Ecology Progress Series* 304 (2005). pp 45-53.

Miller CJH and Dawson, M. (2008). Mark-recapture aerial survey utilising natural markings of wild horses. *Wildlife Research*, 35(4) (2008), pp 365-370.

Career History

Cameron is an Associate Director with AECOM with over 18 years professional experience. Cameron is formerly trained as an ecologist having completed a masters and undergraduate degree in this discipline. In addition, Cameron is also currently completing a Graduate Certificate in Arboriculture.

Cameron has been consulting for approximately ten years and has worked on major residential and commercial developments, linear infrastructure and roads, threatened species monitoring and undertaking ecological reviews and management planning for government agencies. Professionally, Cameron has designed and implemented ecological surveys, environmental impact assessments and ecological approvals within south-eastern Australia.

Cameron has significant experience with Commonwealth, Victorian and NSW environmental legislation and policy and has provided expert planning advice to a range of Victorian clients.

Prior to consulting, Cameron worked for a number of government agencies including Parks Victoria, the Environment Protection Authority (Victoria) and the Department of Primary Industries (Queensland).

Expert Evidence Experience

Cameron also has experience providing expert evidence at Victorian Planning Panels and the Victorian Civil and Administrative Tribunal including:

- West Gate Tunnel Project. Response to the Inquiry and Advisory Committee - Planning Panels Victoria
- Horsham Planning Scheme Amendment C72 – Planning Panels Victoria.
- Stockman Project – Terrestrial Fauna Expert Witness – Planning Panels Victoria.
- VCAT expert evidence - Amendment C23 for Searoad Ferries, Queenscliff.
- VCAT expert evidence - McLears Hill, 143 Nepean Highway, Dromana, Victoria.
- VCAT expert evidence – Aqueduct Road, Langwarrin.

Cameron has also overseen expert panel advice for staff including:

- Birregurra Quarry (MCG Group).
- Princess Highway Duplication (VicRoads).

Selected Experience

West Gate Tunnel Project

West Gate Tunnel project is a key Victorian project to ease traffic congestion in Melbourne's west. The project interacts with several waterways, public parks, and estuarine areas that contain flora and fauna. As the ecology lead Cameron has had to ensure that all aspects of aquatic and terrestrial ecology were appropriately considered. In addition, the project required amenity trees to be considered within the ecology report; this is unusual and required a unique response to meet the State's EES requirements. Cameron is the ecology expert at planning panel for this project

Sites of Biodiversity Significance (SOBS): Biodiversity Conservation and Site Management Plans, Melbourne Water

Cameron provided project coordination (Project Director) and quality review on a project to deliver the first five SOBS management plans. Sites included Monbulk Creek Retarding Basin, Old Joes Creek Retarding Basin, Police Road Retarding Basin, Riddell Road Retarding Basin and Cardinia Creek. The outcomes of the project were the delivery of high quality reports suitable for public dissemination that provide Melbourne Water with risk-based approach to management and clearly articulate program works for a 10 year period.

Stockman Project – Environmental Effects Statement

AECOM was engaged to undertake all fauna related services for a proposed Copper and Zinc mine in the high country of Victoria (Benambra). AECOM's team implemented a range of survey techniques to monitor animal abundance including pitfall trapping, hair tuning, infra-red camera survey, Anabat, call play-back and spotlighting. We also completely reviewed the existing knowledge relating to the site and implemented a risk assessment to conform to the requirements of the EES. Cameron presented at planning panel on this project.

Western Highway – Anthony's Cutting Realignment

Cameron was the Ecological Team Leader for a major infrastructure project west of Melbourne. Cameron was responsible for ensuring all ecological needs on site were met and ensuring compliance with government permit conditions. Cameron supervised up to four ecologists in the active search, capture and translocation of vertebrate fauna, including threatened species, habitat hectare analysis and reporting and general permitting advice.

Hume Freeway Baseline Environmental Assessment

Cameron worked with a consultancy engaged by VicRoads to develop a Roadside Conservation Management Plans for the Hume Freeway. This involved the production of a Roadside Environmental Baseline Report (REBR) for the entire length of the Hume Freeway from the intersection of the Craigieburn Bypass and metropolitan Ring Road to the NSW/Vic border. The aim of the REBR was to provide an overview of key

environmental values and environmental baseline conditions which exist along the roadside.

Woolgoolga to Ballina, Package 6

AECOM' ecologists managed by Cameron completed a number of pre-clearance surveys for Roads and Maritime Services associated with the Pacific Highway upgrade, Package 6. This work involved tree hollow surveys, threatened species surveys and weed mapping. Cameron reviewed all outputs and provided QA/QC for the project.

APA Bethungra to Young Looping Pipeline Environmental Impact Assessment

Cameron was Project Director and provided key ecological input into the Biodiversity Management Plan for the Bethungra to Young natural gas pipeline in southern NSW. This project comprised 70 km of new looping pipeline to connect to the Moomba to Sydney Pipeline System (MSP) mainline at its north east end in Young. NSW and Commonwealth environmental approvals were obtained for the project which was a declared 'Major Project' under NSW legislation. The BMP was required following the approval of the Environmental Assessment, prepared by AECOM.

Peechelba Railway line and Station, Flora and Fauna Assessment

AECOM was engaged by VicTrack Access (VicTrack) to assess an area of crown land that contained former railway line and station infrastructure. This assessment was conducted to inform VicTrack of opportunities and constraints for future management options, including potential lease and/or divestment arrangements.

Desalination Pipeline Post-construction Monitoring, Victoria

Cameron is currently the project manager for a 5 year monitoring program to monitor threatened vertebrate fauna and fish post-construction of the Victorian Desalination Plant water supply pipeline. Southern Brown Bandicoot *Isoodon obesulus obesulus* and Growling Grass Frog *Litoria raniformis* are the two key species targeted during these surveys, which are undertaken twice per year. Fish surveys are undertaken quarterly. The reporting requirements include a detailed technical report and a public annual report.

Wodonga Rail Flora and Fauna Assessment

Seven precincts of land operated by VicTrack Access in the Albury-Wodonga region were assessed for their flora and fauna values, in particular Commonwealth listed vegetation communities and various Commonwealth and State listed threatened species. The precincts included decommissioned track and siding areas as well as active trackside environment. AECOM coordinated and contributed to the subsequent report informing VicTrack of their obligations regarding permitting and future management should they choose to dispose of any of the precincts.

Melbourne Metro Rail

Cameron was the coordinator of all ecological works associated with a rail tunnel and stabling yards for PTV. This involved scoping project requirements, undertaking desktop and comprehensive field based assessments, writing specialist reports and assisting with planning permits, referrals risk assessment and specialist advice.

Armstrong Creek (Geelong) Native Vegetation Precinct Plan

Cameron coordinated the ecological assessment and reporting of a 650 ha site located on the outskirts of Geelong. The site was being re-zoned within Geelong's Urban Growth Zone and required the development of a Precinct Structure Plan and detailed Native Vegetation Precinct Plan. As Project Director, Cameron ensured that the appropriate data was collected, quality was maintained and reporting outputs were of a high standard. In addition, it was Cameron's role to make sure both the client and the regulators were aware of the findings and were engaged in the decision making process such that an acceptable outcome was reached by all parties.

Alexandra – Eildon Water supply pipeline

Cameron worked on a project for Goulburn Valley Water (GVW) to undertake an ecological assessment of the proposed Alexandra / Thornton / Eildon water supply pipeline. Cameron was engaged as the Project Director to ensure that work was undertaken in a timely fashion, was correct and of appropriate quality and met the client needs. This assessment informed GVW of their requirements in regards to the relevant National and State legislation, provided advice on ecological constraints of the development, and methods to mitigate and minimise unacceptable environmental impact.

Stradbroke Landscape Zone Management Plan

Cameron coordinated and undertook a project involving the vegetation assessment (habitat hectares) of 22 state reserves to determine the condition and threatening processes across the landscape. His other tasks included facilitation of a risk assessment workshop and preparation of a management plan.

Net Gain and Ecological Assessments

Cameron has undertaken numerous net gain and ecological assessments of land within Melbourne's growth boundary and within many parts of Victoria. Cameron has undertaken all aspects of these assessments including field components, analysis and offset quantification, planning and permitting components.

Growth Areas Authority Biodiversity Assessment

Cameron was Project Director on a major investigation to study biodiversity patterns within and outside Melbourne's Urban Growth Zone (UGZ). This information was then used to analyse and determine suitable sites for inclusion within the UGZ. This project also involved detailed field assessments within a number of areas including habitat hectare analysis, mapping, targeted flora and fauna surveys. As part of his role as

Project Director, Cameron had to ensure that field work was programmed correctly, resources allocated, quality maintained and that the client was satisfied with completed products.

Environmental Impacts Assessment of Sand Dredging, Port Stanvac, SA

Cameron provided input into a large-scale environmental impact assessment investigating the effects of sand dredging on marine sediment communities in Gulf St Vincent, SA. The project was a collaboration between the University of Adelaide and the SA Coastal Board and was undertaken as part of Cameron's Masters thesis.

Gisborne Marshlands Ecological Assessment

Cameron was involved in an ecological assessment of the Gisborne Racecourse Marshlands Reserve (GRMR). The aim of the assessment was to provide information required to complete an *Environment Protection and Biodiversity Act 1999* (EPBC) referral for submission to the Department of the Environment, Water, Heritage and the Arts (DEWHA).

Melbourne Water Alliance

Cameron was involved in coordinating all ecological work associated with a \$100 million alliance between Melbourne Water and three private businesses. As Manager Ecological Services, Cameron was engaged to manage all 'ecological services' related to the role-out of the river renewal program. As such Cameron has undertaken or provided management and quality review support to over 40 projects in the 2008-2009 period. Projects ranged from small-scale assessment and permitting advice to large-scale assessment of major man-made wetlands.

Plenty Gorge Marshlands Ecological Assessment

Cameron was Project Director on a project for the City of Whittlesea to determine whether it is possible to incorporate floodlighting as part of the proposed Hawkstowe sports field development, without adversely impacting to native fauna (terrestrial and aquatic). The scope of works included an Ecological Impact Assessment (EIA) which analysed potential impacts from floodlighting of the proposed sports field development on ecological values of the Morang

Training

Habitat Hectare Assessment (certificate of competency 2009 and 2016)

Advanced Project Management.

Basic Fire Awareness (Department of Sustainability & Environment)

Resource Officer – Australian Incident Management System (AIMS) (Department of Sustainability & Environment)

Cross-Cultural Training. Parks Victoria.