Table F.1 Potential impacts on Ramsar Wetland – Edithvale-Seaford Wetlands assessed under the EPBC Act Significant Impact Guidelines for Wetlands of international Importance in (Department of the Environment 2013)

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Areas of the wetland being destroyed or substantially modified	The works for the proposed road will occur over 700 m distance from the wetlands such that no direct impacts upon the wetlands are proposed to occur.	Low	No further mitigation measures required for the management of this impact.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
A substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland	Most of the water from the project area does not flow to the Edithvale-Seaford Wetland Complex, however one drainage outfall from the Project area contributes runoff into the southern section of Edithvale wetlands. The catchment area to this outfall extends from Springvale Road to approximately 800 metres south of Springvale Road. It discharges to the Melbourne Water Carrum Lowlands North Drainage Scheme drainage system just south of Edithvale Road. A preliminary surface water report has been completed (WSP 2017c), however additional study and development of specific mitigation measures has not yet been undertaken. It is understood that minor changes to surface water flow to this outfall are possible however can be mitigated such that the impacts upon the Ramsar site are negligible. With regard to groundwater, the groundwater impact assessment (WSP 2017a) determined that the embankment structures will have a negligible impact on the ecological systems at Edithvale Wetlands. Precautionary mitigation is still recommended to be incorporated into the design.	Moderate	Specific mitigation measures will be determined to ensure that impacts to hydrological regimes of the Edithvale wetlands are negligible. Further information is provided in Section 5.3.7.4.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
The habitat or lifecycle of native species, including invertebrate fauna and fish species, dependant upon the wetland being seriously affected	The proposed development may impact upon waterbird use of the Ramsar wetland through noise from haul trucks during construction and from potential increased traffic along Springvale Road through the wetland. Species most at risk of disturbance include migratory shorebirds such as the Sharp-tailed Sandpiper, which are reliant on the wetlands for foraging and roosting habitat. Other fauna species including invertebrate fauna and fish species are unlikely to be significantly affected.	Moderate	Avoid usage of Edithvale Road through the Edithvale wetland for hauling equipment and materials.	There may still be increased traffic volumes along Edithvale Road at times during construction as a result of changed traffic flow conditions, however this impact would be temporary and minor.	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
A substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or	Preliminary surface water investigations by WSP indicate that one drainage outfall from the Project area contributes runoff into the southern section of Edithvale wetlands. The catchment area to this outfall extends from Springvale Road to approximately 800 metres south of Springvale Road. It discharges to the Melbourne Water Carrum Lowlands North Drainage Scheme drainage system just south of Edithvale Road. The Project is required to meet the requirements of the State Environment Protection Policy (SEPP) (Waters of Victoria) for urban stormwater runoff, which requires the protection of beneficial uses and the demonstration of the application of best practice. Melbourne Water's Mordialloc Bypass Stormwater Quality Performance Criteria provides a hierarchy of how stormwater quality treatment measures should be implemented by the Project. The implementation of this, with the aim of achieving best practice, will be determined in upcoming studies.	Low	Implement standard mitigation measures in accordance with VicRoads 177 Environmental Management (Major); no further mitigation measures required for the management of this impact.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
An invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland	The works are unlikely to lead to the introduction or spread of a harmful invasive species within the wetland. The project area, located in a landscape which is moderately to highly modified already, is a sufficient distance from the wetland complex such that impacts from weeds are unlikely to be an issue. The proposed works are unlikely to lead to an increase in pest fauna.	Low	Implement standard mitigation measures in accordance with VicRoads 177 Environmental Management (Major); no further mitigation measures required for the management of this impact.	None	Low

Table F.2 Assessment of potential for significant impacts upon migratory species

SPECIES NAME	COMMON NAME	CRITERION 1	CRITERION 2	CRITERION 3
Calidris acuminata	Sharp-tailed Sandpiper	Possible but unlikely Important habitat present however habitat unlikely to be substantially modified. Nevertheless, carefully-considered mitigation measures are required to ensure the species is not affected by the works.	Unlikely	**Potential**. Potential impacts on feeding and roosting behaviour.
Calidris ferruginea	Curlew Sandpiper*	Important habitat unlikely to be present. Species utilises study area and locality only occasionally and in low numbers with respect to the species' estimated population size.	No important habitat present	Unlikely Species utilises study area and locality only occasionally and in low numbers and the lifecycle is unlikely to be disrupted.
Calidris melanotos	Pectoral Sandpiper	No important habitat present. Species utilises study area and locality in low numbers only with respect to the estimated population size of the species.	No important habitat present	Unlikely. Potential impacts on feeding and resting behaviour however unlikely to impact an ecologically significant proportion of the species.
Calidris ruficollis	Red-necked Stint	No important habitat present. Species utilises study area and locality in low numbers only with respect to the estimated population size of the species.	No important habitat present	Unlikely. Potential impacts on feeding and resting behaviour however unlikely to impact an ecologically significant proportion of the species.
Gallinago hardwickii	Latham's Snipe	**Potential** The Waterways and nearby habitat should be assumed to be important habitat. Some habitat (approximately 5.23 ha) proposed to be lost.	Unlikely – no harmful invasive species likely to become established	Unlikely. Potential impacts on feeding and resting behaviour however this is unlikely to impact an ecologically significant proportion of the species.
Numenius madagascariensis	Eastern Curlew*	Important habitat unlikely to be present. Species utilises study area and locality in low numbers only with respect to the estimated population size of the species.	No important habitat present	Unlikely Species utilises study area and locality only occasionally and in low numbers and the lifecycle is unlikely to be disrupted.

SPECIES NAME	COMMON NAME	CRITERION 1	CRITERION 2	CRITERION 3
Plegadis falcinellus	Glossy Ibis	No important habitat present. Species utilises study area and locality in low numbers only with respect to the estimated population size of the species.	No important habitat present	Unlikely. Potential impacts on feeding and resting behaviour however unlikely to impact an ecologically significant proportion of the species.
Tringa glareola	Wood Sandpiper	No important habitat present. Species utilises study area and locality in low numbers only with respect to the estimated population size of the species.	No important habitat present	Unlikely. Potential impacts on feeding and resting behaviour however unlikely to impact an ecologically significant proportion of the species.

*also listed as critically endangered under the EPBC Act

Table F.3 Potential impacts on Sharp-tailed Sandpiper and Latham's Snipe assessed together under the EPBC Act Significant Impact Guidelines (Department of the Environment 2013)

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Important habitat present for Sharp-tailed Sandpiper at Edithvale-Seaford Wetlands and possibly at Braeside Park, Waterways, and Woodlands Industrial Estate Wetlands for Latham's Snipe. Approximately 5.23 ha of habitat for Latham's Snipe is proposed to be lost. Additional impacts through habitat fragmentation and modification are possible. Some of this habitat currently consists of degraded, exotic grass-dominated vegetation when not inundated, and it is unclear to what extent that this vegetation would support the species (and other waterbirds) in times outside of flooding. Substantial modification of Sharp-tailed Sandpiper habitat is not expected. Changes to hydrological cycles are unlikely and can be mitigated using standard measures (Section 4.12.7.4)	Moderate	Potential/indicative no-go zones have been identified to prevent disturbance of habitat outside of the construction footprint (Figure series 7 Appendix A). These will be further refined following design of the Shared User Path. Buffer zones around important habitat areas should be planned and implemented in the landscape plan for the Project, as recommended in (DoEE 2017a). Further information regarding buffer zones is provided in Section 5.4.3. Barriers close to wetlands, specifically adjacent to Woodlands Industrial Estate wetlands should be incorporated into the landscape plan for the Project where possible to restrict access to habitat (refer Section 5.4.1).	Some direct loss of mapped Latham's Snipe foraging habitat is unavoidable. This alone is unlikely to constitute a significant impact.	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.	It is unlikely that the proposed road will introduce invasive species which are not already in the local area.	Low	Implement standard mitigation measures in accordance with VicRoads 177 Environmental Management (Major); no further mitigation measures required for the management of this impact.	None	Low
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Potential impacts on feeding and resting behaviour from noise and lighting. For the Sharp-tailed Sandpiper, which visits the area regularly in high numbers, this may impact an ecologically significant proportion of the species.	Moderate	Lighting solutions and sound attenuation measures are required to minimise ongoing impacts to important habitat. The solutions which should be considered are provided in Sections 5.3.4 and 5.3.5 of this report. Not all solutions will be practicable, and a revised assessment of residual impact may be required after these measures are fully developed. Barriers close to wetlands, specifically adjacent to Woodlands Industrial Estate wetlands are required to restrict access to habitat. This should be considered in conjunction with design features to promote connectivity across the road including vegetation plantings. Avoid usage of Edithvale Road for haulage during contruction.	None	Low

Table F.4 Assessment of potential for significant impacts upon Swamp Everlasting

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	Population at the project area is not considered an 'important population'. Plants were not recorded within the construction footprint.	Low	No further mitigation measures required for the management of this impact.	None	Low
Reduce the area of occupancy of an important population	Population at the project area is not considered an 'important population'. Plants were not recorded within the construction footprint.	Low	No further mitigation measures required for the management of this impact.	None	Low
Fragment an existing important population into two or more populations	Population at the project area is not considered an 'important population'. Plants were only recorded on one side of the proposed alignment during the survey. Fragmentation is considered unlikely as pollinators are unlikely to be affected by the road.	Low	No further mitigation measures required for the management of this impact.	None	Low
Adversely affect habitat critical to the survival of a species	The habitat at the project area is revegetated/planted habitat, not listed in the recovery plan for the species and not considered critical to the species' survival.	Low	No further mitigation measures required for the management of this impact.	None	Low
Disrupt the breeding cycle of an important population	Population at the project area is not considered an 'important population'. The Project will not disrupt the breeding cycle of the species which reproduces by rizomes (asexual spreading) and sexually (generalist pollinators unlikely to be affected by the works).	Low	No further mitigation measures required for the management of this impact.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project will remove some potential habitat for this species although the recorded plants occur outside of the construction footprint. Additional plants not recorded during targeted survey may be impacted. Without specific mitigation there is also the potential for habitat modification due to changes in overland water flow and drainage which may decrease the quality of the habitat and cause the species to decline in this location.	Moderate	Standard establishment of no go zones (indicative no-go zones provided on Figure series 7) is expected to protect the plants recorded during survey, however a pre-clearing survey at the Waterways is required to locate any new plants within the project area (outside of existing no go zones) and either fence them off to establish a new no go zone or relocate them to nearby potential habitat that is not proposed to be impacted. Specific hydrological mitigation measures (if required) to maintain existing surface flow conditions.are expected to reduce the risk of habitat modification from changes in hydrology.	None	Low
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Although the habitat occurs in an already disturbed landscape, weed invasion is a major threat to the remaining populations of this species across its range (Carter 2011). The works may lead to harmful invasive species becoming established in the species' habitat.	Moderate	Comprehensive weed and disease hygiene measures in the CEMP should include additional monitoring and control following works to protect this threatened species.	None	Low
Introduce disease that may cause the species to decline	There are no known disease risks for this species.	Low	The inclusion of standard disease hygiene measures in the CEMP as per VicRoads 177 Environmental Management (Major) should sufficiently manage any risk.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Interfere with the recovery of the species	The Project does not conflict with any of the stated objectives of the Recovery Plan for this species.	Low	No specific mitigation measures required for the management of this impact.	None	Low

F.3.2 River Swamp Wallaby-grass and Swamp Senecio (assessed together)

These species have been assessed together as their habitat requirements are similar and both are listed as vulnerable under the EPBC Act.

For each of these species, if present in the project area, the population does not meet the criteria for an important population for the following reasons.

- It is not a key source population either for breeding or dispersal, being below detectability in surveys, and having been planted during the rehabilitation of the Waterways.
- It is not necessary for maintaining genetic diversity. The population was introduced from a source population and is likely to be of low genetic diversity compared with remnant populations of the species.
- It is not near the limit of the species' range. Populations of River Swamp Wallaby-grass occur in Victoria, New South Wales, South Australia, Tasmania, and in New Zealand. Populations of Swamp Senecio occur across southern Victoria and in Tasmania.

There are no current or planned Recovery Plans for these species.

Table F.5 provides an assessment of the potential for significant impacts upon the species (assessed together) in accordance with the significant impact criteria.

Table F.5 Assessment of potential for significant impacts upon River Swamp Wallaby-grass and Swamp Senecio

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of an important population of a species	A population at the project area would not be considered an 'important population'.	Low	No specific mitigation measures required.	None	Low
Reduce the area of occupancy of an important population	A population at the project area would not be considered an 'important population'.	Low	No specific mitigation measures required.	None	Low
Fragment an existing important population into two or more populations	A population at the project area would not be considered an 'important population'.	Low	No specific mitigation measures required.	None	Low
Adversely affect habitat critical to the survival of a species	The habitat at the project area is suboptimal revegetated/planted habitat and not considered critical to the species' survival.	Low	No specific mitigation measures required.	None	Low
Disrupt the breeding cycle of an important population	A population at the project area would not be considered an 'important population'. The Project would not disrupt the breeding cycle of the species.	Low	No specific mitigation measures required.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project will modify or remove some potential habitat for the species at the project area through shading and vegetation loss. There is the potential for minor changes in overland water flow and drainage which may decrease the quality of the habitat and cause the species to decline in this location. Sediment-laded run-off from the road may lead to a decrease in the quality of habitat for these species.	Moderate	Standard establishment of no go zones (indicative no go zones are shown on Figure series 7 Appendix A) is expected to protect the potential habitat present from direct impacts. Specific hydrological mitigation measures (if required) are expected to negate the risk of habitat modification from changes in hydrology. Erosion and sedimentation measures should be in line with the Victoria EPA Principals of Best Practice Guidelines, including Environmental Guidelines for Major Construction Sites (Environmental Protection Agency 1996), Construction Techniques for Sediment Pollution Control (Environmental Protection Agency 1991), and EPA Publication 960 ‘Doing it right on subdivisions’ (Environmental Protection Agency 2004).	None	Low
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species’ habitat	The works may lead to additional invasive species becoming established in the species’ habitat, however this is unlikely. The potential habitat occurs in an already disturbed landscape.	Low	The inclusion of standard comprehensive weed hygiene measures in the CEMP as per VicRoads 177 Environmental Management (Major) should sufficiently manage this risk.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Introduce disease that may cause the species to decline, or	There are no known disease risks for this species.	Low	The inclusion of standard disease hygiene measures in the CEMP as per VicRoads 177 Environmental Management (Major) should sufficiently manage this risk.	None	Low
Interfere with the recovery of the species.	There is no Recovery Plan for this species. There are numerous populations of this species in Victoria and the potential habitat within the project area	Low	No specific mitigation measures required.	None	Low

Table F.6 Assessment of potential for significant impacts upon Matted Flax-lily

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	The species is known to occur (planted) in the broader Waterways area, east of the project area. It was not recorded during surveys of the project area. If species is present, it is most likely to occur outside of wetland areas at the Waterways and therefore outside of the construction footprint (although it may still occur within the broader project area). If present, it occurs in low numbers only and any loss would be unlikely to result in a long term decrease in the size of a population.	Low	No specific mitigation measures required.	None	Low
Reduce the area of occupancy of the species	As above.	Low	No specific mitigation measures required.	None	Low
Fragment an existing population into two or more populations	The Project may bisect a population (if present), however this is unlikely to substantially reduce gene flow (as pollination of this species is unlikely to be hindered by the road).	Low	No specific mitigation measures required.	None	Low
Adversely affect habitat critical to the survival of the species	The habitat at the project area is suboptimal revegetated/planted habitat and not considered critical to the species' survival.	Low	No specific mitigation measures required.	None	Low
Disrupt the breeding cycle of a population	The Project would not disrupt the breeding cycle of a population.	Low	No specific mitigation measures required.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The Project may remove some potential habitat for the species, although the species is most likely to occur outside of the construction footprint. This is unlikely to cause the species to decline at the Waterways.	Low	No specific mitigation measures required.	None	Low
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The works may lead to additional invasive species becoming established in the species' habitat, however this is unlikely. The potential habitat occurs in an already disturbed landscape	Low	The inclusion of standard comprehensive weed hygiene measures in the CEMP as per VicRoads 177 Environmental Management (Major) should sufficiently manage this risk.	None	Low
Introduce disease that may cause the species to decline	There are no known disease risks for this species.	Low	The inclusion of standard disease hygiene measures in the CEMP as per VicRoads 177 Environmental Management (Major) should sufficiently manage this risk.	None	Low
Interfere with the recovery of the species.	There is no Recovery Plan for this species. There are numerous populations of this species in Victoria and the potential habitat within the project area is unlikely to be of value to the species' recovery.	Low	No specific mitigation measures required.	None	Low

Table F.7 Potential impacts on Australasian Bittern assessed under the EPBC Act Significant Impact Guidelines (Critically Endangered and Endangered Species) (Department of the Environment 2013)

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	The proposed development may impact the species through direct loss of habitat and/or indirect impacts such as increased mortality through road collisions. Up to 5.23 ha of habitat for this species is proposed to be removed. Much of this mapped habitat is currently degraded, exotic grass-dominated vegetation, which may only support the species when inundated. None of the habitat in the area is breeding habitat. The species usually requires large, relatively undisturbed wetlands and as such, further fragmentation of the wetland network through the proposed bypass may affect the suitability of nearby habitat for the species.	Moderate	Indicative no-go zones have been identified to prevent disturbance of habitat outside of the construction footprint (Figure series 7 Appendix A). These will need to be refined. Lighting solutions and sound attenuation measures will be considered to minimise ongoing impacts to important habitat. The solutions which should be considered are provided in Sections 5.3.4 and 5.3.5 of this report. Barriers between the road and habitat , particularly adjacent to Woodlands Industrial Estate wetlands, and at the Waterways, are required to restrict access to habitat and minimise mortality from vehicle collisions. This should be considered in conjunction with design features to promote connectivity across the road including vegetation plantings. Potential barrier types and locations, and proposed aims for revegetation, are provided in Section 5.4.1. Buffer zones around important habitat areas should be planned and implemented in the landscape plan for the Project (refer Section 5.4.3).	Some direct loss of habitat is unavoidable, however this is non-breeding habitat and, with the mitigation measures proposed, is considered unlikely to result in a long-term decrease in the size of a population.	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Reduce the area of occupancy of a species	The works may reduce the area of occupancy for the Australasian Bittern as approximately 5.23 ha of mapped habitat is proposed to be lost. This habitat is non-breeding habitat and is likely to be only ocassionally utilised by the species. Without mitigation, the works may also lead to avoidance of nearby habitat.	Moderate	Mitigation measures provided above are required to ensure that the species continues to utilise the habitat at the project area and surrounds after the works are complete.	Some direct loss of habitat is unavoidable. As this is not breeding habitat, and the species is considered likely to still utilise the area following construction, the impact of this loss is unlikely to be significant.	Low
Fragment an existing population into two or more populations	The proposed road will fragment habitats at Braeside Park, Waterways, and Woodlands Industrial Estate Wetlands which are currently joined or have ‘soft barriers’ with agricultural landscapes. The broader landscape is highly modified with urban, industrial, agricultural and road networks currently creating a fragmented landscape on throughout the broader region. Therefore, Australasian Bittern must be somewhat tolerant of some level of fragmentation.	Moderate	Measures to maintain connectivity for this species are required for areas north of the proposed bridge (between Woodlands Industrial Estate and Braeside Park). Particularly wetland plantings in and around modified drainage swales to provide a stopover point and encourage movement between wetlands. Further information regarding proposed revegetation is provided in Section 5.4.2. . Revegetation under the bridge and minimisation of wetland vegetation clearance under the bridge is required to ensure that the species is able to safely pass beneath (refer 5.3.2)	Some reduction in connectivity is unavoidable however the residual impact is likely to be small.	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Adversely affect habitat critical to the survival of a species	There have been a number of sightings of Australasian Bittern throughout The Waterways (Cook, D undated) and the broader area (Appendix D). The habitat area proposed to be lost (up to 5.23 ha)is non-breeding habitat and is generally highly modified. However, wetlands either side of the project area (Braeside Park and Woodland Wetlands) are part of the Carrum IBA which is recognised as supporting globally important bird populations, including Australasian Bittern 0 - 14 individuals (Ecology Australia 2016). These areas could be considered habitat critical to the survival of the species.	Moderate	Mitigation measures posed above will prevent adverse affects upon critical habitat.	None	Low
Disrupt the breeding cycle of an population	There is limited evidence about the extent of breeding Australasian Bittern near the project area. Two bird survey reports didn't report breeding (Herman & Purnell 2016; Silcocks 2016) and (Ecology Australia 2016) report that Edithvale-Seaford Wetlands is an important non-breeding refuge.	Low	No specific mitigation measures required to mitigate this risk.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Whilst there have been a number of sightings close to the project area, the habitat area proposed to be impacted (up to 5.23 ha) is non-breeding habitat and is highly modified. However, any reduction of habitat and indirect impacts such as increased noise, light and disturbance upon nearby habitat may affect the species.	Moderate	Mitigation measures posed above should assist to manage risks.	While up to 5.23 ha of mapped habitat is proposed to be removed, with the mitigation measures to protect remaining habitat, the species is unlikely to decline in the area.	Low
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The works are unlikely to lead to the introduction or spread of a harmful invasive species within the wetland. The project area is located in a landscape which is moderately to highly modified already. The proposed works are unlikely to lead to an increase in pest fauna.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Introduce disease that may cause the species to decline, or	As above	Low	No specific mitigation measures required to mitigate this risk.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Interfere with the recovery of the species.	There is currently no Recovery Plan for this species. Projects such as Bittern Project by Birdlife Australia, management by Melbourne Water and other bodies are working towards the recovery of the species in the region. Whilst there have been a number of sightings close to the project area, the habitat area proposed to be impacted is relatively small given the extent of higher quality foraging habitat in the locality. However, any reduction of habitat and indirect impacts such as increased noise, light and disturbance may affect the species and interfere with its recovery. As it is non-breeding habitat, provided the species continues to utilise the remaining habitat to the same extent, and mortality is not increased, the recovery of the species is unlikely to be affected.	Moderate	Mitigation measures posed above should assist to ensure that the recovery of the species is not affected.	None	Low

Table F.8 Potential impacts on Curlew Sandpiper and Eastern Curlew assessed under the EPBC Act Significant Impact Guidelines (Critically Endangered and Endangered Species) (Department of the Environment 2013)

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Lead to a long-term decrease in the size of a population	The proposed development is unlikely to lead to a long term decrease in the size of a population as no primary habitat for the species is proposed to be removed.	Low	No mitigation measures required	None	Low
Reduce the area of occupancy of a species	Unlikely to significantly reduce the area of occupancy as no primary habitat for the species is proposed to be removed.	Low	No mitigation measures required	None	Low
Fragment an existing population into two or more populations	The proposed road will fragment wetland habitats at Braeside Park, Waterways, and Woodlands Industrial Estate Wetlands which are currently joined or have 'soft barriers' with agricultural landscapes. The broader landscape is highly modified with urban, industrial, agricultural and road networks currently creating a fragmented landscape on throughout the broader region. The species are highly mobile and the increase in fragmentation is unlikely to affect the species.	Low	No mitigation measures required	None.	Low
Adversely affect habitat critical to the survival of a species	The habitat at the project area and immediate vicinity supports low numbers of the species only. As the nearby Edithvale Wetlands will not be affected, the Project is highly unlikely to adversely affect any habitat critical to the species' survival.	Low	No mitigation measures required	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Disrupt the breeding cycle of a population	The species do not breed at the project area or in the locality (non-breeding migrant).	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Whilst there have been sightings close to the project area, no primary habitat for the species is proposed to be lost. However, indirect impacts upon nearby habitat such as increased noise, light and disturbance may affect the species.	Moderate	Lighting solutions and sound attenuation measures should be considered to minimise ongoing impacts to important habitat. The solutions which will be considered are provided in Sections 5.3.4 and 5.3.5 of this report. Barriers close to wetlands, specifically adjacent to Woodlands Industrial Estate wetlands, are required to restrict access to habitat. Buffer zones around important habitat areas should be planned and implemented in the landscape plan for the Project. Further information regarding buffer zones is provided in Section 5.4.3.	None	Low
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The works are unlikely to lead to the introduction or spread of an invasive species within the wetland which is harmful to this species. The project area, located in a landscape which is moderately to highly modified already, is a sufficient distance from primary habitat such that impacts from weeds are unlikely to be an issue. The proposed works are unlikely to lead to an increase in pest fauna.	Low	No specific mitigation measures required to mitigate this risk.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Introduce disease that may cause the species to decline, or	As above	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	There is currently no Recovery Plan for these species. Whilst there have been sightings close to the project area, no primary habitat for the species is proposed to be lost. However, any reduction of habitat and indirect impacts such as increased noise, light and disturbance may affect the species.	Moderate	Mitigation measures posed above should assist to manage risks.	None	Low

Table F.9 Potential impacts on Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH NO MITIGATION MEASURES	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH MITIGATION MEASURES
Reduce the extent of an ecological community	Project would clear up to 2.40 hha of this community. In Victoria, it is estimated that there are 18,224 ha of EVCs most similar to Seasonal Herbaceous Wetlands, with 490 ha remaining in the South East Coastal Plain IBRA bioregion according to (TSSC 2012). The removal of the maximum area of impact (2.40 ha) for the Project would constitute 0.01% of the total area remaining, or 0.49% of the total area in the South East Coastal Plain Bioregion. Approximately 30% of the Seasonal Herbaceous Wetlands in the construction footprint is high quality revegetated wetland at The Waterways, whereas the remainder are low quality remnants which may not constitute the community, but have been assessed in a dry phase. Provided that impacts are kept to a maximum of 2.40 ha, this minor reduction in the extent of the community is unlikely to constitute a significant impact. Mitigation is required to ensure this.	Moderate	Establishment of standard no-go zones (indicative no go zones shown on Figure series 7 Appendix A) will ensure no direct impacts to the community outside of the construction footprint, however the following may also be required. Design will aim to maintain existing surface water flows where possible. Ensure that any changes to surface water flows do not impact this community (refer 5.3.7.4). Use Water Sensitive Urban Design (WSUD) to pre-treat water prior to run-off into Seasonal Herbaceous Wetlands.	The residual impact is expected to be up to 2.40 ha of loss of this community. This is unlikely to constitute a significant impact upon the community.	Low
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The project would fragment a number of patches of Seasonal Herbaceous Wetlands, most notably at the Waterways.	Moderate	A bridge is proposed to pass over the majority of Seasonal Herbaceous Wetlands through the Waterways. However, minimisation of impacts at the Waterways and revegetation under the bridge is required to maintain the connectivity of this community.	Some fragmentation is unavoidable however the impact is not likely to be significant.	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH NO MITIGATION MEASURES	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH MITIGATION MEASURES
Adversely affect habitat critical to the survival of an ecological community	Project would clear up to 2.40 ha of the community. Within the study area this community is a mix of high quality revegeted Seasonal Herbaceous Wetlands or highly modified and species poor remnants through paddocks. The relatively small area of modified vegetation is unlikely to be critical to the survival of the community.	Low	No specific mitigation measures required.	None	Low
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The construction of the road has the potential to modify abiotic factors which could impact the remaining areas of the community. This includes potential changes to surface water drainage and increased pollution. The risks to surrounding groundwater reliant ecosystems is considered to be low (WSP 2017a).	Moderate	A preliminary surface water report has been completed (WSP 2017c).however additional study and development of specific mitigation measures has not yet been undertaken.Design will aim to maintain existing surface water flows where possible. Mitigation of changes to surface water and quality is discussed in Section 5.3.7.4.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH NO MITIGATION MEASURES	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT WITH MITIGATION MEASURES
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Species composition under the bridges in the Waterways may be altered from increased shading, therefore the extent of community under the bridge is included within the 2.40 ha proposed to be lost. There is the potential for impacts of shading to vegetation outside of the construction footprint. Some changes may occur, however, due to the roughly north-south orientation of the bridge, shading is unlikely to substantially alter the floristic composition of vegetation adjacent to the construction footprint. Species composition outside of the construction footprint may be substantially altered if there are significant changes to abiotic factors such as surface water drainage, or as a result of roadside vegetation management (leading to increase in weed cover etc).	Moderate	Specific surface water mitigation measures to maintain existing flow to this community, to be determined by hydrologists. Comprehensive weed and disease hygiene measures in the CEMP should include additional monitoring and management of the road edges following works to protect this community. Mowing regime and timing should also be determined with consideration of ecological impacts.	None	Low

Table F.10 Potential impacts on Natural Damp Grassland of the Victorian Coastal Plains assessed under the EPBC Act Significant Impact Guidelines

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Reduce the extent of an ecological community	Project would clear approximately 0.03 ha of the community. In Victoria, it is estimated that there is approximately 10 ha of Natural Damp Grassland remaining, according to (TSSC 2015). The removal in this project would constitute 0.3% of total area of known community. However, all of this community is revegetated (i.e. non natural). There is the potential for additional loss of this community without specific mitigation measures.	Moderate	Establishment of standard no-go zones (indicative no go zones are shown on Figure series 7 Appendix A) will ensure no direct impacts to the community outside of the construction footprint, however the following may also be required. Design will aim to maintain existing surface water flows where possible. Ensure that any changes to surface water flows do not impact this community (refer 5.3.7.4).	Residual impact of 0.03 ha of this community is unavoidable. This is unlikely to be a significant impact upon the community.	Low
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The project may increase fragmentation of this community at the Waterways, however as this is a revegetated community, and the project will not be directly splitting a patch, the impact is likely to be negligible.	Low	No specific mitigation measures required.	None	Low
Adversely affect habitat critical to the survival of an ecological community	The small area of the community proposed to be removed is unlikely to be critical to the survival of the community. Standard no go zones are likely to be sufficient to prevent direct impacts outside of the construction footprint.	Low	No specific mitigation measures required.	None	Low

SIGNIFICANT IMPACT CRITERIA	RISK TO MNES WITHOUT MITIGATION MEASURES	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH NO MITIGATION MEASURES IMPLEMENTED)	SPECIFIC MITIGATION MEASURE(S)	RESIDUAL RISK TO MNES WITH MITIGATION MEASURES APPLIED	LIKELIHOOD OF A SIGNIFICANT IMPACT (WITH MITIGATION MEASURES IMPLEMENTED)
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	The construction of the road has the potential to modify abiotic factors which could impact the remaining areas of the community. This includes potential changes to surface water drainage and increased pollution. The risks to the Waterways from changes in groundwater is considered to be low (WSP 2017a).	Moderate	Establishment of standard no-go zones will ensure no direct impacts to the community outside of the construction footprint, however the following may also be required. Design will aim to maintain existing surface water flows where possible. Ensure that any changes to surface water flows do not impact this community (refer 5.3.7.4). Further information is provided in Section 5.3.7.4.	None	Low
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Species composition beyond the construction footprint may be substantially altered if there are significant changes to vegetation management (leading to an increase in weed cover etc).	Moderate	Comprehensive weed and disease hygiene measures in the CEMP should include additional monitoring and management of the road edges following works to protect this community. Mowing regime and timing should also be determined with consideration of ecological impacts.	None	Low