22 Matters of National Environmental Significance

Tables

Figures

22.1 OVERVIEW

This chapter provides an assessment of the potential impact on Matters of National Environmental Significance (MNES) from all phases of the project (as outlined in Chapter 4: *EES assessment framework and approach*) including the current initial phase, construction phase, and maintenance and operation of the project. It contains information from the impact assessments presented in Appendix C: *Flora and fauna impact assessment*, Appendix K: *Groundwater impact assessment* and Appendix J: *Surface water impact assessment.* This chapter should be read in conjunction with Chapter 10: *Biodiversity*, Chapter 16: *Surface water and hydrology* and Chapter 17: *Groundwater*.

As provided within the scoping requirements, this Environment Effects Statement (EES) is an accredited assessment process under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) through a Bilateral Assessment Agreement that exists between the Commonwealth and State of Victoria. The Commonwealth Minister or delegate will decide whether the project is approved, approved with conditions or refused under the EPBC Act, after having considered the Minister for Planning's assessment under the *Environment Effects Act 1978* (EE Act). Note that what are generally termed 'effects' in the EES process correspond to 'impacts' defined in section 82 of the EPBC Act.

MNES listed under the EPBC Act include:

- world heritage properties
- national heritage places
- wetlands of international importance (listed under the Ramsar Convention)
- listed threatened species and ecological communities
- migratory species protected under international agreements
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- nuclear actions, including uranium mines
- a water resource, in relation to coal seam gas development and large coal mining development.

SIGNIFICANT IMPACT

A 'significant impact' is defined under the EPBC Act as 'an impact that is important, notable, or of consequence, having regard to its context or intensity' (DoE 2013). If a project is likely to have a significant impact on one of the nine MNES listed above, the 'action' must be referred to the Commonwealth Department of Environment and Energy (DoEE). This 'referral' is then released to the public for comment.

The project was referred to the DoEE under the EPBC Act on 30 October 2017 (EPBC 2017/8019). On 30 January 2018, the delegate for the Commonwealth Minister for the Environment and Energy determined that the project is a 'controlled action' as it is likely to have a significant impact on the following MNES, protected under part 3 of the EPBC Act, specifically relating to:

- Ramsar wetlands (sections 16 and 17B)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A).

Ramsar wetlands refer to wetlands that have been designated under Article 2 of the Ramsar Convention or declared by the Federal Minister for the Environment and Energy to be a declared Ramsar wetland under the EPBC Act.

The EPBC Act provides for the listing of nationally threatened native species and ecological communities, native migratory species and marine species.

The EPBC Act protects Australia's native species and ecological communities by providing for:

- identification and listing of species and ecological communities as threatened
- development of conservation advice and recovery plans for listed species and ecological communities
- development of a register of critical habitat
- recognition of key threatening processes
- where appropriate, reducing the impacts of these processes through threat abatement plans.

Migratory species are those animals that migrate to Australia and its external territories, or that pass through or over Australian waters during their annual migrations.

Listed migratory species are those listed in the:

- Convention of the Conservation of Migratory Species of Wild Animals (Bonn Convention)
- China-Australia Migratory Bird Agreement (CAMBA)
- Japan-Australia Migratory Bird Agreement (JAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

22.2 EES OBJECTIVES AND REQUIREMENTS

The following draft evaluation objectives relevant to MNES have been provided within the Scoping Requirements (DELWP 2018):

DRAFT EVALUATION OBJECTIVE: BIODIVERSITY

To avoid, minimise or offset potential adverse effects on native vegetation, listed migratory and threatened species and communities, as well as habitat for other protected species.

DRAFT EVALUATION OBJECTIVE: WATER, CATCHMENT VALUES AND HYDROLOGY

To minimise adverse effects on groundwater, surface water and floodplain environments and minimise effects on water quality and beneficial uses, including the ecological character of the Edithvale-Seaford Wetlands Ramsar site.

DRAFT EVALUATION OBJECTIVE: LAND CONTAMINATION AND ACID SULFATE SOILS

To prevent adverse environmental or health effects from disturbing, storing or influencing the transport/ movement of contaminated or acid-forming material.

Table 22.1 provides project-specific key issues relating to MNES as identified in the Scoping Requirements.

Table 22.1 EES key issues – MNES

Key issues
Biodiversity:
Loss of, degradation, modification or hydrological alteration to any ecological communities listed as threatened under the EPBC Act, including revegetated areas, and including but not limited to: • Critically endangered Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (EPBC Act).
Direct loss of, or degradation to, habitat for flora and fauna species listed as threatened or migratory under the EPBC Act, including but not limited to avifauna species, in particular: • Australian Fairy Tern *Sternula nereis nereis* • Eastern Curlew *Numenius madagascariensis* • Curlew Sandpiper *Calidris ferruginea* • Australasian Bittern *Botaurus poiciloptilus* • Sharp-tailed Sandpiper *Calidris acuminata* • Latham's Snipe *Gallinago hardwickii.*
Indirect loss of vegetation or habitat quality, that may support any listed species or other protected fauna, resulting from hydrological or hydrogeological change, edge effects, overshadowing, habitat fragmentation, loss of connectivity, or other disturbance impacts including noise from haul trucks during construction and from potential increased traffic along Springvale Road through the Edithvale Wetland.
Potential for adverse effects on the ecological character and biodiversity values of the listed Edithvale-Seaford Wetlands Ramsar site including, but not limited to, the bird species mentioned above.
Potential for indirect effects on biodiversity values including but not limited to those effects associated with changes in hydrology (including surface and groundwater changes), water quality (i.e. on water dependent ecosystems), contaminants and pollutants, weeds, pathogens and pest animals.

Key issues
Potential for impacts on EPBC Act listed species and other protected species resulting from construction and operation activities, including but not limited to significantly increasing mortality due to road traffic, and disturbance to foraging, roosting and breeding of listed threatened species and listed migratory species due to increased lighting, noise and traffic.
Potential for indirect significant impacts due to shading of vegetation because of the project including but not limited to elevated structures, such as the proposed bridges over Mordialloc Creek and the Waterways wetlands.
The availability of suitable offsets for the loss of native vegetation and habitat for relevant listed threatened species, ecological communities and migratory species under the EPBC Act.
Water, catchment values and hydrology:
The potential for adverse effects on the functions, values and beneficial uses of surface water environments (including Braeside West and Mordialloc Creek Wetlands, Waterways wetlands, Woodlands Industrial Estate wetlands, and associated Mordialloc Creek drainage system) due to the project, such as interception or diversion of flows or changed water quality or flow regimes during construction and operation.
The potential for adverse effects on the functions, values and beneficial uses of groundwater due to the project, in particular on groundwater dependent ecosystems (GDEs) and the ecological character of the Edithvale-Seaford Wetlands due to changes in groundwater levels, behaviour or quality.
The potential for adverse effects on nearby and downstream water environments (including the Mordialloc Creek catchment and Edithvale-Seaford Wetlands) due to changed flow regimes, floodplain storage, run-off rates, water quality changes, or other waterway conditions during construction and operation.
The potential for adverse effects on biodiversity values of the Edithvale-Seaford Wetlands Ramsar site including, but not limited to: • Australasian Bittern; and • Sharp-tailed Sandpiper.
Land contamination and acid sulfate soils
Potential for adverse environmental effects on the Edithvale-Seaford Wetlands Ramsar site resulting from disturbing, storing or influencing the transport/movement of contaminated or acid-forming material.

22.3 LEGISLATION AND POLICY

This EES is an accredited assessment process under the EPBC Act due to the likelihood for significant impact to MNES. The EPBC referral operates through a Bilateral Assessment Agreement that exists between the Commonwealth and State of Victoria. The Commonwealth Minister or delegate will decide whether the project is approved, approved with conditions or refused under the EPBC Act, after having considered the State Minister for Planning's assessment under the EE Act. The relevant international, Commonwealth and state legislation and policy relevant to this MNES assessment is provided in Table 22.2.

Table 22.2 Legislation and policy – MNES

Legislation/policy	Description
International	
Convention of the Conservation of Migratory Species of Wild Animals (Bonn Convention) *China-Australia Migratory Bird Agreement (CAMBA)* *Japan-Australia Migratory Bird Agreement (JAMBA)* *Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)*	For over 30 years, Australia has played an important role in international cooperation to conserve migratory birds in the East Asian-Australasian Flyway (the Flyway), entering into bilateral migratory bird agreements with Japan in 1974, China in 1986 and most recently the Republic of Korea in 2007. Each of these agreements provides for the protection and conservation of migratory birds and their important habitats, protection from take or trade except under limited circumstances, the exchange of information, and building cooperative relationships. Birds listed on the annexes to these three agreements, together with those on Appendices I or II of the Bonn Convention, must also be placed on the migratory species list under the EPBC Act. Bilateral migratory bird agreements provide an important mechanism for pursuing conservation outcomes for migratory birds, including migratory waterbirds. Agreements exist with Japan (JAMBA), China (CAMBA) and the Republic of Korea (ROKAMBA), the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), the Ramsar Convention on Wetlands, the Agreement on the Conservation of Albatrosses and Petrels (ACAP), and through the East Asian - Australasian Flyway Partnership.
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act is the Australian Government's central piece of environmental legislation. It provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places defined in the Act as MNES. There are nine MNES to which the EPBC Act applies. Three out of the nine matters are relevant to the project area: wetlands of international importance, nationally threatened species and ecological communities and migratory species. The delegate for the Commonwealth Minister for the Environment and Energy determined that the project is a 'controlled action' as it is likely to have a significant impact on the following MNES, protected under part 3 of the EPBC Act (as included in this chapter): • Ramsar wetlands (sections 16 and 17B) • Listed threatened species and communities (sections 18 and 18A) • Listed migratory species (sections 20 and 20A).

Legislation/policy	Description
State	
Environment Effects Act 1978 (Vic) (EE Act)	The criteria for the types of potential effects on the environment that might be of significance are provided in the Ministerial Guidelines for Assessment of Environmental Effects under the *EE Act 1978* (DSE 2006). They include impacts to native vegetation, matters listed under the FFG Act, and wetlands. The criteria come under two categories: • individual potential environmental effects (one or more effects indicates potential significance of the impacts) • a combination of potential environmental effects (two or more effects indicate potential significance of the impacts). An assessment against the criteria was completed (WSP 2017b) and identified that one or more individual effects may be triggered. The project was the subject of an EES Referral, and a determination was made by the Minister that an EES is required.

22.4 METHODOLOGY

22.4.1 Biodiversity

A database and literature review of available information on past land uses, vegetation communities and flora and fauna has been completed. Relevant databases were searched for records of threatened species within 5km of the project area and details of the literature review can be found in Appendix C: *Flora and fauna impact assessment*. This review was used to prepare a list of threatened flora and fauna species, ecological communities, migratory species and any significant habitat previously recorded or predicted to occur in the study area and the broader locality including those listed under the EPBC Act.

A series of ecological surveys have been completed for the project. Detail regarding these surveys is provided in Chapter 10: *Biodiversity.* The surveys of most relevance to MNES are summarised below:

- Vegetation assessments of EPBC Act listed ecological communities were undertaken. The process involved using plots/quadrats to assess patches of native vegetation against determination criteria for the EPBC Act listed ecological communities. For details on the documents that outline the determination criteria refer to Table 22.3 below.
- Targeted flora surveys for Swamp Everlasting, Matted Flax-lily and River Swamp Wallaby-grass were completed in December 2014, with additional surveys in January–May 2017 and November–December 2017. As no survey guidelines exist for these species, surveys used published flowering times to determine when the most optimal time was for surveys.
- Surveys for threatened waterbird and migratory shorebirds were completed in March 2013. Additional surveys for these birds were undertaken over the 2014–2015 summer, including targeted surveys for Latham's Snipe and Australasian Bittern. More recently, detailed waterbird surveys were completed in November 2017 – March 2018 which consisted of walked transects and stationary spot counts. These survey methods are in accordance with survey recommendations outlined in Commonwealth documents. Refer to Table 22.3 below for further details.

  The overall survey effort undertaken for this project exceeds that recommended in both the survey guidelines (although the guidelines do not provide survey effort guidance for most of the species relevant to the project). The survey guidelines were used to help guide the assessment of impacts and not to determine species presence/absence. Bird surveys completed for the project were supplementary to the wealth of records available from Birdlife Australia, which conducts regular surveys, and from publicly accessible databases for the area, which is a popular birdwatching hotspot.

  Detailed bird habitat mapping was also undertaken to supplement records and surveys and to inform the likelihood of occurrence and impact assessment for each species.

- Targeted surveys for the Growling Grass Frog were first conducted in the summer of 2012–2013, and again in the summer of 2014–2015. Sound recorder surveys for the species were then undertaken twice in 2017. Surveys considered and were consistent with the recommendations outlined in Commonwealth survey guideline documents (refer to Table 22.3 for details).
- Dwarf Galaxias were surveyed for in the 2014–2015 summer and again in 2016–2017. Surveys involved a visual examination of aquatic habitats to determine likelihood of presence of Dwarf Galaxias and the use of dip nets and other methods in areas of possible occurrence. Survey methods and survey effort were consistent with those stipulated in Commonwealth documents (refer to Table 22.3 for further details).

Table 22.3 Commonwealth guidelines used to survey and assesses MNES

MNES		Survey guidelines	Significant impact criteria	Recovery plan
Wetlands of international importance (listed under the Ramsar convention)				
Edithvale-Seaford Ramsar wetland		Not applicable	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Recovery Plan not available but relevant plans include: Edithvale-Seaford Wetlands Ramsar Site Management Plan (Ecology Australia, 2016)
Nationally threatened species and ecological communities				
FLORA	Matted Flax-lily	Non-existent	Significant Impact Guidelines 1.1 MNES (DoE 2013)	National Recovery Plan for the Matted Flax-lily *Dianella amoena* (Carter, 2010)
	Swamp Everlasting	Non-existent	Significant Impact Guidelines 1.1 MNES (DoE 2013)	National Recovery Plan for the Swamp Everlasting *Xerochrysum palustre* (Carter & Walsh 2011)
	Swamp Fireweed	Non-existent	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Non-existent
FAUNA	Australasian Bittern	Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA 2010)	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Non-existent
	Australian Painted Snipe	Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA 2010)	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Non-existent

MNES		Survey guidelines	Significant impact criteria	Recovery plan
	Curlew Sandpiper	Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA 2010) EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE 2017)	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Non-existent
	Eastern Dwarf Galaxias	Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the EPBC Act (DEWHA 2011)	Species not present despite several repeated surveys. Considered low likelihood of occurrence.	National recovery plan for the Dwarf Galaxias *(Galaxiella pusilla)* (Saddlier, Jackson and Hammer 2010)
	Grey-headed Flying-fox	Surveys were not considered necessary as Grey-headed Flying-foxes are likely to forage on trees within the study area intermittently, but also forage widely across the Port Philip and Westernport Catchment area and beyond and there are no impacts on breeding or roosting areas along the Yarra River	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Draft Recovery Plan for the Grey-headed Flying-fox *Pteropus poliocephalus* (Commonwealth of Australia 2017)
	Growling Grass Frog	Survey guidelines for Australia's threatened frogs: Guidelines for detecting frogs listed as threatened under the EPBC Act (DEWHA 2010)	Species not present despite several repeated surveys. Considered low likelihood of occurrence.	National Recovery Plan for the Southern Bell Frog *Litoria raniformis* (Clemann & Gillespie 2012)
Ecological communities				
Natural Damp Grassland of the Victorian Coastal Plains		Approved Conservation Advice (including listing advice) for the Natural Damp Grassland of the Victorian Coastal Plains (TSSC 2015)	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Non-existent
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains		Commonwealth Listing Advice on Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (TSSC 2012)	Significant Impact Guidelines 1.1 MNES (DoE 2013)	Not yet undertaken, proposed.

MNES	Survey guidelines	Significant impact criteria	Recovery plan
Migratory species			
Migratory Birds	EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE 2017) Draft referral guideline for 14 birds listed as migratory species under the EPBC Act (DotE 2015) Survey Guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA 2010)	Significant Impact Guidelines 1.1 MNES (DoE 2013) EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE 2017) Draft referral guideline for 14 birds listed as migratory species under the EPBC Act (DotE 2015)	Not available for any of the relevant migratory bird species

22.4.2 Surface water

The surface water impact assessment methodology included:

- desktop assessment of existing water assets in the study area, including drainage assets, waterways and floodplains
- investigations of the existing condition of water assets, including water quality and flow regime
- flood conditions assessment and modelling (additional information is provided in Chapter 16: *Surface water and hydrology)*.

22.4.3 Groundwater

A desktop review was performed of publicly available information on the regional groundwater setting and the relationship between groundwater and the functioning of the wetlands near the project.

A field investigation was completed to establish site-specific conditions related to local and regional conditions identified in the desktop review. The intrusive investigations were designed to:

- install a targeted monitoring network
- gather water level data from key aquifers
- collect groundwater samples and analyse water quality parameters of the groundwater systems underlying the project alignment
- measure the flow rates in the aquifers
- set up monitoring bores for ongoing groundwater monitoring.

An intrusive site investigation program consisting of a multi-stage drilling program, sampling and aquifer tests was conducted. Initially, 19 groundwater monitoring bores and a leachate monitoring bore were drilled within the project area. To inform the numerical groundwater modelling, a further 16 groundwater bores were drilled to increase the spatial area covered by the monitoring network.

Automated data loggers and groundwater level monitoring equipment were installed in 20 of the 35 bores. Groundwater level loggers record water levels at 6-hourly intervals. Groundwater sampling and analysis was also undertaken on three occasions between August 2017 and March 2018 to capture seasonal variations in the aquifers and surrounding wetlands. Samples were taken from groundwater monitoring bores and from surface waterbodies, including Waterways Wetlands, Mordialloc Creek, Edithvale Wetlands (North and South) and Port Philip Bay at Edithvale. The purpose of the sampling was to obtain baseline water quality data and to compare chemical signatures of the water sampled to inform an understanding of connectivity across the surface water and groundwater bodies. Groundwater levels were also taken manually during each sampling event.

Aquifer permeability was tested in 34 of the groundwater bores to estimate the groundwater flow rates in the relevant aquifers. The flow rates are used as an input to the numerical groundwater model.

The groundwater monitoring network is intended to remain in place, whilst the project will provide ongoing monitoring through the construction phase and for the five years following completion of construction.

22.5 STUDY AREA

The MNES assessment comprised specific study areas within proximity of the project area as defined in the biodiversity, surface water and groundwater studies found in Chapter 10: *Biodiversity*, Chapter 16: *Surface water and hydrology* and Chapter 17: *Groundwater*. The areas of ecological significance in the project locality including Ramsar sites are provided in Figure 10.2 in Chapter 10: *Biodiversity*, whilst Figure 22.1 in this chapter illustrates the Edithvale-Seaford Wetlands catchment. Additional information on the Edithvale component of this wetland catchment is provided in Chapter 17: *Groundwater.*

22.6 EXISTING CONDITIONS

22.6.1 Ramsar wetlands

There are no Ramsar wetlands located within the project area; however, the Ramsar listed Edithvale-Seaford Wetlands are near the project area.

The 158ha Seaford Wetland is located approximately 4km from the project. It is of a sufficient distance from the proposed works that the likelihood of impact is negligible.

The Edithvale component of the Ramsar site ('Edithvale Wetlands') is located approximately 700m west of the project boundary, in the southern extent of the alignment. It consists of a northern section of predominantly deep constructed pools and some shallow areas, separated by Edithvale Road from a southern section of predominantly shallow wetland.

The Edithvale-Seaford Ramsar wetlands are internationally recognised for their significance to threatened and migratory birds. They regularly support over 1% of the flyway population of the migratory shorebird Sharp-tailed Sandpiper (DSE 2012), as well as numerous other migratory, nomadic, and resident birds.

These Ramsar listed wetlands offer high-value seasonal mudflat foraging habitat for migratory waders, as demonstrated in the records for these threatened fauna, which is not generally available within the permanent wetland habitat provided within the Project Area or regional Water Sensitive Urban Design (WSUD) treatment systems.

Most migratory shorebirds which visit Australia are present during the non-breeding period, from as early as August to as late as April/May each year. Numbers at Edithvale Wetlands generally peak in the summer months. Breeding of these birds primarily occurs elsewhere in Asia (DoEE 2017). Their summer habitat is important for replenishing their condition prior to their onward migration and breeding season.

This site is recognised as a component of the Carrum Wetlands 'Important Bird and Biodiversity Area (IBA)' (BirdLife International 2017).

The Edithvale Wetland is a freshwater to brackish wetland, which provides flood mitigation for the surrounding areas, as well as valuable wetland fauna habitat. It features extensive marsh habitat which floods in winter and draws down in summer, providing valuable foraging habitat for migratory waders. It is a popular recreational bird watching destination.

The Edithvale Wetlands are divided into north and south sections (refer to Figure 22.1):

- *Edithvale South Wetlands* comprises a natural depression on the south side of Edithvale Road with its lowest point at 0.3m below sea level (GHD 2006). The south wetlands are predominantly fed by three drains from catchments to the east via sediment ponds at the edge of the macrophyte zone. The winter and spring standing water level generally sits at around 0.00m Australia Height Datum (AHD), but increases to 0.78mAHD during rain events, and discharges to Edithvale north wetlands and Centre Main Drain when water levels exceed 0.02mAHD. Low summer and autumn rainfall results in evaporation and water levels dropping below 0.00mAHD. A manually operated pump on Centre Main Drain can pump water from the drain into the Edithvale south wetlands during dry periods.
- *Edithvale North Wetlands* is predominantly a series of constructed wetlands within the former floodplain on the north side of Edithvale Road. Stormwater enters the wetlands from stormwater drains to the east, via two sediment ponds and from Edithvale South Wetlands via a pipe under Edithvale Road. A series of weirs control water flow between different wetland cells and limit total drawdown during prolonged dry or drought conditions. A series of drains and overland flow provide the stormwater that supplies these cells.

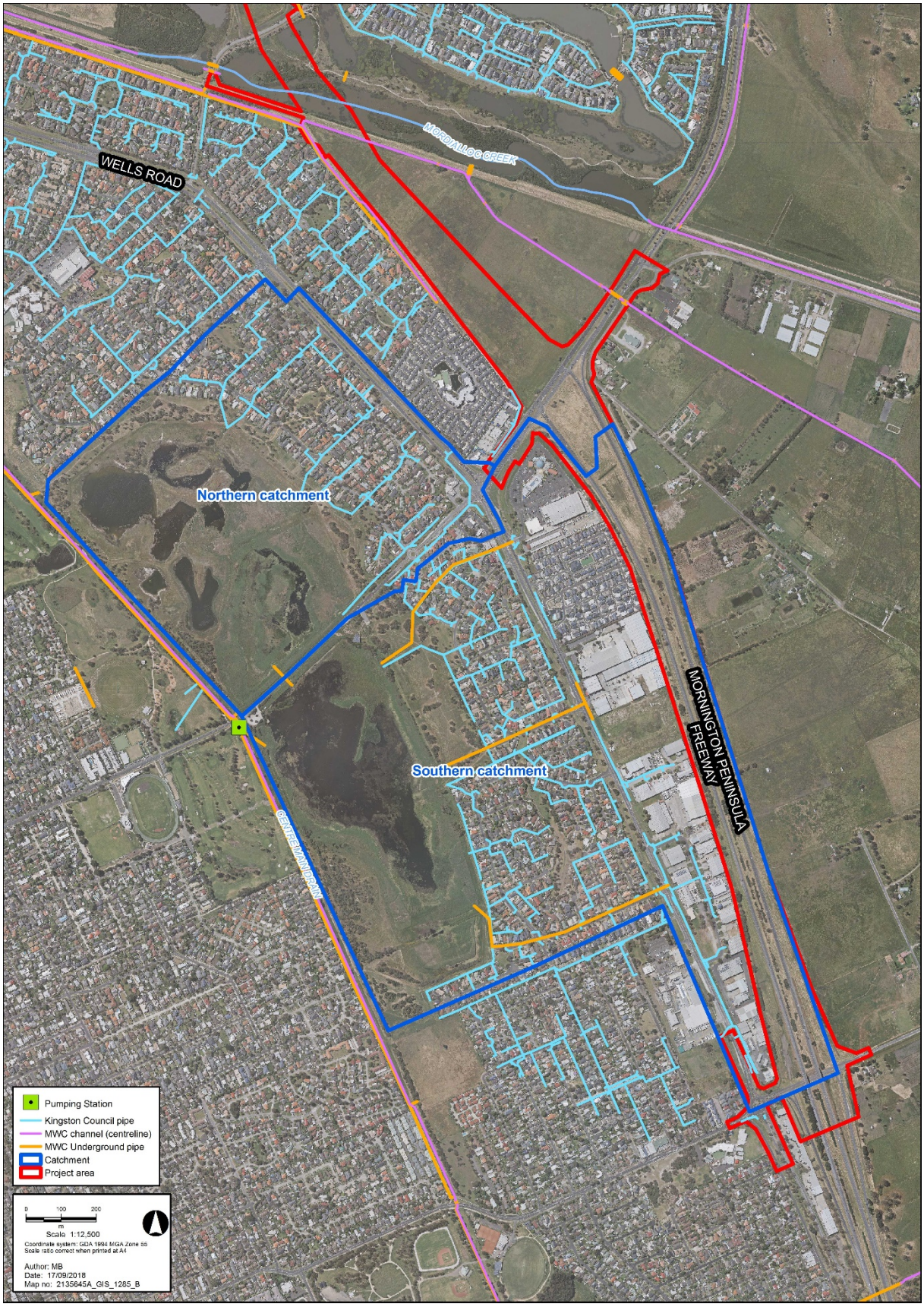

Figure 22.1 Edithvale-Seaford northern and southern catchment areas

22.6.2 Listed threatened species and communities

Threatened communities

The majority of the project area consists of exotic vegetation (including exotic roadside vegetation and modified agricultural land) and constructed features such as roads; however, the project area also supports 12 Ecological Vegetation Classes (EVCs). The full list of EVCs is provided in Chapter 10: *Biodiversity*. Some of the native vegetation recorded had the potential to meet the criteria for EPBC Act listed threatened ecological communities, and was assessed against the community criteria.

Two EPBC Act listed threatened ecological communities were recorded, both listed as critically endangered:

- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
- Natural Damp Grassland of the Victorian Coastal Plains.

These communities were planted as part of the creation of Waterways Wetlands however are considered remnant for the assessment of impacts. They are generally of high quality, with low weed cover. More information about how these communities were assessed, including the changes in the mapped extent of communities since the Project Referral, is provided in Appendix C: *Flora and fauna impact assessment*.

Photo: Nic McCaffrey

Figure 22.2 **Natural Damp Grassland of the Victorian Coastal Plains, Waterways Wetlands. Also classified as South Gippsland Plains Grassland (EVC 132_62)**

Photo: Nic McCaffrey

Figure 22.3 **Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains, Waterways Wetlands. Also classified as Plains Sedgy Wetland (EVC 647)**

Figure 22.4 illustrates the EPBC Act listed communities surrounding and within the project area, as well as the locations of EPBC Act-listed threatened flora which are discussed in the following section.

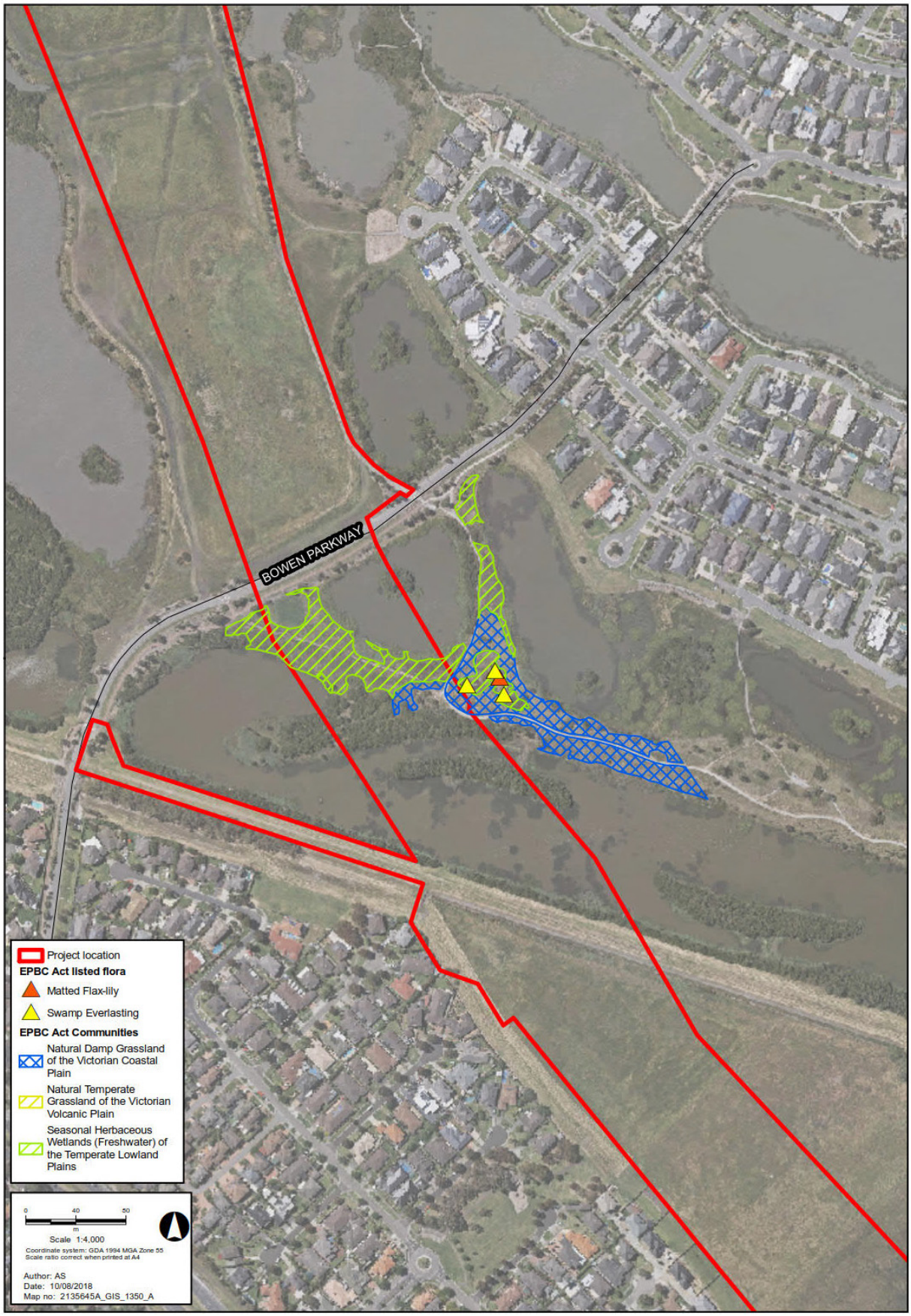

Figure 22.4 EPBC Act listed flora and communities within and adjacent to the project area

Flora

Over a series of targeted surveys, two EPBC Act-listed species were identified:

- Matted Flax-lily
- Swamp Everlasting.

A third species, Swamp Fireweed, was considered to have the potential to occur in the project area of the Waterways Wetlands and therefore, may be impacted by the project. While initially another EPBC Act listed species, River-Swamp Wallaby Grass, was considered to have the potential to occur in the project area, it was not recorded over several targeted surveys and is now considered to have a low likelihood of occurrence.

MATTED FLAX-LILY *DIANELLA AMOENA* – ENDANGERED

This species was recorded outside of the project area during targeted flora surveys completed for this study. The known location of the species at the Waterways wetlands is not currently proposed to be impacted by the project.

SWAMP EVERLASTING *XEROCHRYSUM PALUSTRE* – VULNERABLE

This species was recorded outside of the project area during targeted flora survey completed for this study. The known location of the species at the Waterways wetlands is not currently proposed to be impacted by the project.

SWAMP FIREWEED – VULNERABLE

Although not recorded in the project area during surveys, this species is known to have been planted in the Waterways Wetlands. It may occur in shallow wetlands and margins of deeper wetlands.

Photo: Nic McCaffrey

Figure 22.5 **Swamp Everlasting, Waterways Wetlands**

Photo: Nic McCaffrey

Figure 22.6 **Matted Flax-lily flower, Waterways Wetlands**

Photo: Nic McCaffrey

Figure 22.7 **Matted Flax-lily leaves, Waterways Wetlands**

FAUNA HABITAT

Fauna habitat values within the project area include:

- the constructed wetlands at the Waterways, immediately south of Governor Road, which includes some permanent and seasonal wetland habitats at Mordialloc Creek and fringing swamp vegetation. The wetlands provide habitat for a diverse range of aquatic and terrestrial species
- predominantly exotic grassland (predominantly highly modified with some small patches of remnant vegetation) occurring adjacent to Braeside Park and Woodlands Industrial Estate
- roadside weedy grassland and small drains/drainage lines, some of which provide foraging habitat for wetland birds (particularly after rain) and habitat for frogs
- some remnant and planted trees which provide foraging and nesting habitat for woodland birds.

Higher quality habitat for threatened and migratory fauna occurs in the locality of the project area. This includes the 'Carrum Swamp Important Bird and Biodiversity Area' (BirdLife International 2017), which comprises a number of wetlands, including areas near the project area: Woodlands Industrial Estate Wetlands, Braeside Park Wetlands and Edithvale Wetlands.

Nine different waterbird habitat types were mapped at the study area (which included the wetlands immediately adjacent to the project area). The distribution of habitat types helped inform the impact assessment for each species and the development of mitigation (refer to Figure 10.5 in Chapter 10: *Biodiversity*).

THREATENED SPECIES

A combined total of 210 vertebrate fauna species have been recorded within 500m of the project area from several sources (including surveys completed for the project). A total of 41 species of conservation significance have been recorded, 13 of which are EPBC Act listed migratory bird species.

A total of 102 fauna species of state and/or national significance were assessed for the potential to occur within 5km of the study area. Of these species, 44 are considered to have greater than a 'low' likelihood of occurrence within the study area based on database review, habitat assessment, and targeted survey. Of these, four are species listed as threatened under the EPBC Act. Table 22.4 below describes these species, the availability of nearby records, and the known habitat present at and nearby the project area.

Photo: Samantha Vertucci

Figure 22.8 **Example of shallow mudflats – preferred habitat type for shorebirds and waders; Woodlands Wetlands**

Photo: Allan Richardson

Figure 22.9 **Migratory and critically endangered Curlew Sandpipers (front two right) and migratory Sharp-tailed Sandpipers (three behind), with Grey Teal (four rear ducks) – Braeside Park Wetlands, March 2018**

Table 22.4 EPBC Act listed fauna with a likelihood of occurrence greater than 'low'

Common name	EPBC Act status	Likelihood of occurrence	Count of sightings (5km VBA)	Summary of Birdlife records within 500m of project area	Habitat within or nearby the project area
Australasian Bittern	Endangered	High	175	45 records, over 19 years. Recorded at Woodlands Wetlands and Braeside Wetlands. No breeding was observed. Where counts were recorded, results were typically 1 but did reach as high as 3 on three occasions.	Well-vegetated freshwater wetlands, particularly those with shallow water areas and dense emergent vegetation and reedbeds. Movement can occur through dense low vegetation surrounding wetlands. Habitat occurs at Braeside Wetlands, Woodlands Wetlands and, to a lesser extent, Waterways Wetlands, as well as well-vegetated drainage lines in the area. Australasian Bittern has not been recorded/observed breeding in the area however is known to be a regular winter visitor in low numbers.
Australian Painted Snipe	Endangered	Low-moderate	6	Two records, both at Braeside. One was recorded in November 1986 and the other in February 1994. No breeding has been observed.	Habitat consists primarily of ephemeral freshwater wetlands, particularly following flooding events, that support areas of exposed mud, shallow water and low vegetation. Within the study area, potential habitat is largely limited to Braeside Park Wetlands. The species is not regularly recorded and habitat is unlikely to generally be of high value, however it may become more valuable when inland Australia is in drought.
Curlew Sandpiper	Critically endangered, Migratory	Moderate (observed)	71	Four records only. Three of the records came from Braeside Park in January 1995 (three separate days of surveys) and the last was recorded in Woodlands Wetlands in November 2004. Counts ranged between 3–8.	Shallow fresh to saline wetlands, typically supporting mudflats and low emergent or fringing vegetation. The project area itself is unlikely to support important habitat for this species, however, foraging habitat occurs nearby at Braeside Park Wetlands and Woodlands Wetlands. The species was recorded at Braeside Park Wetlands during targeted surveys completed for this study.
Grey-headed Flying-fox	Vulnerable	Moderate	13	N/A	Limited foraging habitat (i.e. eucalypts and related genera) occurs within the road alignment. The species is unlikely to roost or regularly forage within the study area itself, although potential habitat occurs at adjacent Braeside Park and Woodlands Industrial Estate.

Three EPBC Act listed fauna species are known to have once occurred within or adjacent to the project area, however are now considered unlikely to occur. These are discussed in Table 22.5 below.

Table 22.5 EPBC Act species which once occurred within the project area

Species	EPBC Act status	Reason for low likelihood
Eastern Dwarf Galaxias *Galaxiella pusilla*	Vulnerable	Although potential habitat occurs within Mordialloc Creek and associated wetlands, targeted surveys undertaken for the project in 2014–2015 failed to detect this species. In addition, Streamline Research has undertaken extensive sampling for Melbourne Water throughout the length of the Mordialloc Bypass (Freeway) over the past decade without detecting the species. Additional habitat assessment and dip-netting was completed in 2016-2017 and the species was determined to be unlikely to occur. In a large flood event, there is the slight possibility that the species could be flushed into the Mordialloc Creek. However, the high degree of modification (including presence of exotic fish species such as Gambusia), and the lack of connectivity with high quality known habitat means that it is unlikely that the Mordialloc Creek could support an ongoing population of the species.
Growling Grass Frog *Litoria raniformis*	Vulnerable	A translocated population of the species was introduced to the Waterways Estate in January 2002, and has since been regularly monitored, however there have been no records of the species in that location or elsewhere in the locality since 2006. Surveys were completed in 2012–2013 and 2014–2015 (Biosis 2015). Areas surveyed included Waterways Estate, Melbourne Water wetlands to the north of Waterways, and wetlands within Braeside Park. Surveys conducted in 2017 for this study did not detect any definite Growling Grass Frog calls. The species is considered unlikely to currently occur within the project area or vicinity.
Southern Brown Bandicoot *Isoodon obesulus obesulus*	Endangered	The species was known to occur in the Braeside area but is now considered locally extinct, with no recent records of the species in the locality. The closest known extant population is in Cranbourne.

22.6.3 Listed migratory species

The study area and vicinity provide foraging and roosting habitat for multiple migratory bird species, including species listed on one or more of several international agreements (JAMBA, CAMBA and ROKAMBA) and is thus listed pursuant to the EPBC Act. Migratory birds with a greater than low likelihood of using habitat in the study area are presented in Table 22.6. A description of the types of migratory species is presented below.

Shorebirds and waders

Migratory shorebirds which visit Australia are primarily present during the non-breeding period, from as early as August to as late as April/May each year. Numbers at the wetlands associated with the study area generally peak in the summer months.

The Edithvale-Seaford Wetlands are internationally important for their value to migratory waders. Migratory birds are generally highly mobile and will move between habitat patches depending on local conditions (water levels etc.), thus all habitat patches in an area can be important at different times. The wetlands closely associated with the project, including Woodlands Wetlands, Braeside Park Wetlands, and the Waterways/Mordialloc Creek can be considered part of the same habitat area for the species when they're present. The shallow water and emergent vegetation habitat types mapped at Braeside Park Wetlands, and to a lesser extent, at Woodlands Wetlands, are of particular value to migratory shorebirds, which rely on mudflats for foraging in summer. Most of these birds prefer open areas of habitat with good visibility, such as the shallow open areas at Braeside Wetlands. The exception to this is snipes which require the security of vegetation.

Although not a shorebird, the Glossy Ibis also utilises shallow wetland habitat.

Other migratory birds

The other listed migratory birds with the potential to occur at the project area include the Glossy Ibis, Rufous Fantail, Fork-tailed Swift and White-throated Needletail.

The Fork-tailed Swift and White-throated Needletail are predominantly aerial species. They use many different habitat types and are infrequently recorded in the area.

Table 22.6 Migratory birds with a likelihood of occurrence greater than 'low'

Common name	EPBC Act status	Count of sightings (5km VBA)	Summary of birdlife records within 500m of project area	Habitat within or nearby the project area
Common Greenshank	Migratory	78	Four records for this species. Two were from Braeside in 1999, one from Braeside in 2000 and the last from Waterways in 2002.	Preferred habitat of shallow fresh to brackish wetlands and mudflats is largely limited in the study area to wetlands in the south of Braeside Park.
Curlew Sandpiper	Critically endangered, Migratory	71	Four records only. Three of the records came from Braeside Park in January 1995 (three separate days of surveys) and the last was recorded in Woodlands Wetlands in November 2004. Counts ranged between 3–8.	Shallow fresh to saline wetlands, typically supporting mudflats and low emergent or fringing vegetation. The project area itself is unlikely to support important habitat for this species, however, foraging habitat occurs nearby at Braeside Park Wetlands and Woodlands Wetlands. The species was recorded at Braeside Park Wetlands during targeted surveys completed for this study.
Fork-tailed Swift	Migratory	N/A	One record from Mordialloc Creek in 2008.	A predominantly aerial species which feeds on the wing, occurs across many different habitat types and is considered secure. The project area is highly unlikely to support important habitat for this species.
Glossy Ibis	Migratory	49	Two records of this species, both at Braeside. One was in March 1999 and the second in November 2006.	Habitat consists of shallow freshwater wetlands, particularly where there are trees for roosting surrounding the wetland. Such wetland habitat occurs in Braeside Park, Woodlands and Waterways.
Latham's Snipe	Migratory	259	Over 70 recorded entries. Almost half of the entries were observed at Braeside Park while Woodlands wetlands and Mordialloc Creek made up the rest. Recorded counts ranged between 1–8.	Typically recorded in well-vegetated waterbodies or wet areas, including flooded grasslands and marshes. Suitable habitat occurs in and around waterbodies and low-lying areas at Braeside Park Wetlands, Woodlands Wetlands and Waterways Wetlands/Mordialloc Creek. Vegetated drainage lines and associated riparian areas may also support suitable habitat, including Dingley Drain (e.g. within Braeside Park) and Mordialloc Creek.

Common name	EPBC Act status	Count of sightings (5km VBA)	Summary of birdlife records within 500m of project area	Habitat within or nearby the project area
Long-toed Stint	Migratory	4	N/A	Freshwater to brackish wetlands, particularly shallow water areas with mudflats and some low vegetation. The very low number of records indicate that the locality is unlikely to support important habitat for this species, however the species may visit shallow water habitat at Braeside Park Wetlands and Woodlands Wetlands in appropriate conditions.
Marsh Sandpiper	Migratory	46	Six records, all from Braeside, between 1994 and 2012.	Preferred habitat of shallow fresh to brackish wetlands and tidal flats is largely limited in the study area to wetlands in the south of Braeside Park.
Pectoral Sandpiper	Migratory	34	One record of this species in 2013 at Braeside Wetlands.	Shallow fresh to saline wetlands, generally with mudflats and low emergent or fringing vegetation. Foraging habitat occurs at Braeside Wetlands and Woodlands Wetlands.
Red-necked Stint	Migratory	98	Five records at Woodlands Wetlands and Braeside Wetlands. Earliest record was from 1994 and the most recent was in 2005. Recorded counts were 1 or 2.	Freshwater to brackish wetlands, particularly shallow water areas and mudflats. Foraging habitat occurs nearby at Braeside Wetlands and Woodlands Wetlands.
Ruff	Migratory	N/A	N/A	Suitable habitat consists of freshwater wetlands with shallow areas, including mudflats, as well as flooded grasslands. While some potential habitat occurs in Braeside Park and low-lying parts of the alignment, the species is a rare visitor to the area.
Rufous Fantail	Migratory	N/A	One record at Braeside Park in March 2011.	Typical habitat consists of moist forest with a shaded understorey, and riparian areas in drier woodlands. Potential habitat within the area would be limited to Braeside Park.
Sharp-tailed Sandpiper	Migratory	197 (under-reported)	Most records are from Braeside Park. Recorded counts varied considerably from 1-277. In 2004 the count was 3,105 for a single day of surveying at Woodlands Wetlands.	Shallow fresh to saline wetlands, typically supporting mudflats and low emergent or fringing vegetation. The project area itself is unlikely to support habitat for this species, however, foraging habitat occurs nearby at Braeside Park Wetlands and Woodlands Wetlands. The species was recorded at Braeside Park Wetlands in moderate numbers (56) during surveys completed in 2018 for this Project.

Common name	EPBC Act status	Count of sightings (5km VBA)	Summary of birdlife records within 500m of project area	Habitat within or nearby the project area
White-throated Needletail	Migratory	28	N/A	An aerial species occurring over many different habitat types, rarely directly utilising vegetation. Likely to forage above the study area regularly, but not be directly reliant upon vegetation.
Wood Sandpiper	Migratory	52	Seven entries, all recorded at Braeside in 1993, 1994, 1995, 1999 and 2014. Recorded counts ranged between 1-3.	Potential habitat of shallow freshwater wetlands with some emergent and fringing vegetation occurring in Braeside Park and Woodlands, and potentially Waterways.

22.7 RISK ASSESSMENT

An environmental risk assessment (ERA) was undertaken to identify key surface water, groundwater and biodiversity risks associated with all phases of the project, including the current initial phase, construction phase, and operations and maintenance of the project. The methodology for the risk assessment is described in Chapter 4: *EES assessment framework and approach* of this EES and has been applied throughout the impact assessments and technical EES chapters.

The ERA methodology does not directly correspond to the assessment of the 'significance' of impacts under the EPBC Act. Therefore, risks relating to EPBC Act listed values are not included within this Chapter, whilst they are provided in Chapter 10: Biodiversity, Chapter 16: Surface water and Chapter 17: Groundwater. The comprehensive risk register for the project can be found in Attachment I: *Environmental risk assessment report*. This approach prevents duplication and provides focus within this Chapter on assessments under the relevant significant impact criteria for the EPBC Act.

22.8 IMPACT ASSESSMENT AND MITIGATION

An impact assessment to determine 'significant impacts' on MNES has been undertaken in accordance with the Significant Impact Guidelines 1.1. MNES (DEWHA 2013) for Ramsar wetlands, listed threatened species and communities, listed migratory species and to determine cumulative impacts.

Initial design for the project consisted of an arterial road with an overpass at Springvale Road. This design underwent significant investigation during the EES and EPBC referral processes; however, subsequent traffic modelling indicated that the arterial road option would not achieve the project objectives for relieving traffic congestion in the area. The traffic modelling recommended that a freeway was the only option that could achieve the project objectives.

The impact assessments were subsequently based on the project as described in Chapter 6: *Project description*, which includes provision for upgrade to a six-lane freeway in the future, within the existing project area described in this EES. Traffic modelling and associated noise and air quality impacts have been assessed based on a four-lane freeway *operation*, whilst vegetation removal has assumed the *construction* of a road that caters for a six-lane road width.

The incorporation of the additional two lanes within the reference design increases the overall footprint of the road, which will increase the impact on some vegetation communities. The reference design caters for population growth now, whilst avoiding the need to cause significant, albeit short-term, construction impacts to these sensitive areas again in the future.

Should MRPA or VicRoads seek to expand the freeway to six lanes in the future, further planning scheme amendments will not be required, so long as works remain within the existing project area. A revised Environmental Management Framework (EMF) relating to the upgrade works will be required (EPR EM1 – refer to Chapter 23: *Environmental management framework*). The revised EMF must contain any additional mitigation and EPRs to manage impacts, including those to MNES, to an acceptable level. The revised EMF will be provided to the Minister for Planning for assessment and to determine if public consultation is required.

22.8.1 Ramsar wetlands

An assessment of project impacts on the ecological values of the Edithvale Wetlands (part of the Edithvale-Seaford Ramsar site) has been completed and is provided in Table 22.7 below.

Table 22.7 Significant impact criteria assessment of project impacts on Ramsar wetland

Significant impact criteria	Project impacts
Areas of the wetland being destroyed or substantially modified	The works for the proposed road will occur over 700m from the wetlands therefore **no direct impacts** upon the wetlands is proposed to occur.
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	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 800m south of Springvale Road. It discharges to the Melbourne Water Carrum Lowlands North Drainage Scheme drainage system just south of Edithvale Road. Surface water assessment and water balance modelling, as discussed in Chapter 16: *Surface water and hydrology,* have determined that, with the Water Sensitive Road Design (WSRD) proposed, changes to surface water flow at this outfall will be minor. The results indicate that any changes are likely to be from slightly increased surface water input (i.e. from an increase in impervious road surface in the catchment). This would occur mainly in times of high rainfall and be well within natural variation. Based on this modelling, changes to the wetting/drying cycle of the wetlands, including to the extent and availability of the valuable seasonal mudflat habitat, are expected to be negligible. The groundwater assessment completed for the project determined that the embankment structures and piling will have a negligible impact on the ecological systems at Edithvale Wetlands. Piling at the Wetlands bridge structure will involve single, separated piles, that will not limit the groundwater flow. Hydraulic connectivity already exists between the upper aquifer layers, limiting the risk of the project introducing new pathways for groundwater contamination. An independent peer review was undertaken on the groundwater model and surface water balance model for Edithvale Wetlands. It was concluded that the models and reports developed as part of the groundwater assessment were adequate and fit-for-purpose to demonstrate **negligible direct and cumulative impact** to the hydrology of the Edithvale Wetlands.
The habitat or lifecycle of native species dependent on the wetland, including invertebrate fauna and fish species, being seriously affected	Based on the surface and groundwater assessment work completed for the project, impacts on species' habitat or lifecycle from hydrological changes is highly unlikely. The project may impact upon waterbird use of the Ramsar wetland through noise from haul trucks during construction and from potential increased traffic along Edithvale 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 affected. To limit the described impact, Edithvale Road (through the Edithvale Wetlands) will not be used for hauling equipment and materials during construction (EPRs B2 and B4). This will reduce the risk of disturbance, as well as avoiding the potential for contamination from trucks transporting contaminated soil from the project. There may still be short periods of increased traffic volumes along Edithvale Road during construction as a result of changed traffic flow conditions, however this impact would be **temporary and minor**.

Significant impact criteria	Project impacts
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 have an adversely impact on biodiversity, ecological integrity, social amenity or human health	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. The surface water design for the project goes beyond the requirements of the SEPP by ensuring there is negligible change in nutrient levels in all sensitive receptors, including Edithvale Wetlands (EPR W1 and W3). The risk of a petrol/other spill occurring on the road, and of pollutants entering the wetlands will be mitigated by bio-retention systems and spill containment (EPR W1 and W2). A very minor reduction in salinity is possible due to dilution from increased permeable surface in the catchment. Given the scale of the potential change in water levels, this is highly unlikely to affect the vegetation and habitat values present. Therefore, **no significant impacts** to water quality are anticipated which may adversely impact on MNES.
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 project is unlikely to lead to an increase in pest fauna. EPRs B5 and B6 contain requirements for appropriate weed management to be provided in the CEMP (EPR EM1) and applied on site during construction and operation. Therefore, **no significant impacts** from invasive species are anticipated.

As detailed above, no significant impact on habitat at Edithvale Wetlands is expected. In addition, there are no EPBC Act listed threatening processes relevant to the Ramsar wetland likely to be exacerbated by the project. However, a number of threatened and migratory fauna species which visit Edithvale Wetlands are also known to periodically visit the wetlands in proximity to the project area, particularly the seasonal mudflat/shallow water habitats at Braeside Park Wetlands. This includes the Australasian Bittern (EPBC Act listed Endangered) and Sharp-tailed Sandpiper (EPBC Act listed Migratory). Although the Edithvale-Seaford Wetlands supports considerably more of this habitat than the wetlands associated with the project area, when migratory and nomadic fauna are present in the area they will move between nearby areas of habitat depending on local conditions. It is therefore important that all local area habitat for these species is protected. The potential for impact on individual threatened and migratory fauna and flora species and communities is addressed below.

22.8.2 Listed threatened species and communities

Figure 22.10 in the existing conditions section 22.6 of this Chapter illustrates the EPBC Act listed communities surrounding and within the project area, as well as the locations of EPBC Act-listed threatened flora.

Threatened communities

The project would result in the following impacts on EPBC Act listed ecological communities:

- 0.24 ha maximum anticipated loss of Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (excluding area previously assessed as the community)
- 0.04 ha maximum anticipated loss of Natural Damp Grassland of the Victorian Coastal Plains.

These maximum areas of anticipated loss include areas underneath the Mordialloc Creek bridge, and a buffer to the bridge to allow for construction and potential shading impacts.

An assessment in accordance with the Significant Impact Guidelines 1.1 was undertaken for each of these communities. The full assessments can be found in Chapter 10: *Biodiversity*, however the assessments determined that a significant impact upon these communities was unlikely. The potential for some fragmentation of Seasonal Herbaceous Wetlands was identified at Mordialloc Creek, however this will be managed by rehabilitation and revegetation under the bridge with shade-tolerant species, and re-establishment of landform and substrate under the bridge to facilitate this (EPR B1 and B5). There is the potential for construction to increase the spread of weeds into the communities, however additional weed monitoring and management contained within the Construction

Environmental Management Plan (CEMP) and during operation/maintenance will avoid impact to retained and rehabilitated vegetation at the Waterways (EPR B5 and B6).

One key threatening process listed under the EPBC Act, 'land clearance' is relevant to the listed communities. The project is unlikely to exacerbate any other relevant threatening processes.

Threatened flora

Twelve EPBC Act threatened flora species were identified as having the potential to occur within or nearby the project area. A targeted flora survey identified two of these species, Matted Flax-lily and Swamp Everlasting, just outside the project area east of the proposed bridge over Mordialloc Creek. Both species have been planted within the Waterways Wetlands as part of the created wetlands, however they are considered remnant for assessing impacts.

An additional species, Swamp Fireweed, was determined to have the potential to occur, despite not being detected over several targeted surveys. No other EPBC Act listed species are considered to have a greater than 'low' potential to occur in the project area.

An assessment in accordance with the Significant Impact Guidelines 1.1 was undertaken for each of these species and these are summarised below, along with any required mitigation measures. The full significant impact criteria assessments can be found in Appendix C: *Flora and fauna impact assessment*.

One key threatening process listed under the EPBC Act, 'land clearance' is relevant to the listed species. The project is unlikely to exacerbate any other relevant threatening processes.

MATTED FLAX-LILY *DIANELLA AMOENA*

This species, listed as Endangered under the EPBC Act, was recorded outside the project area during targeted flora surveys completed for this project. If present outside of the one recorded location, it is most likely to occur outside of wetland areas at the Waterways and therefore outside of the areas proposed to be impacted. It would occur in low numbers only and any loss would be unlikely to result in a long term decrease in the size of a population, reduce the species area of occupancy or disrupt the species breeding cycle. Furthermore, the habitat present within the project area is suboptimal revegetated/planted habitat and is not considered critical to the species' survival.

Significant impact is not anticipated.

SWAMP FIREWEED / SMOOTH-FRUITED GROUNDSEL *SENECIO PSILOCARPUS*

Swamp Fireweed is listed as Vulnerable under the EPBC Act. The species was not recorded within the project area during targeted flora surveys however it is known to have been planted at the Waterways wetlands. If a population is present, it would not constitute an "important population" as it is not a key population for breeding or dispersal, is not necessary for maintaining genetic diversity and is not near the limit of the species' range. As such, the assessment completed under the significant impact guidelines determined that the likelihood of any significant impact upon the species, with no mitigation measures, is low.

Significant impact is not anticipated.

SWAMP EVERLASTING *XEROCHRYSUM PALUSTRE*

Swamp Everlasting is listed as Vulnerable under the EPBC Act and was recorded within the project area during targeted flora surveys. However, the population at the project area does not meet the criteria for an "important population" as it is not a key population for breeding or dispersal, is not necessary for maintaining genetic diversity and is not near the limit of the species' range. Thus, the potential for significant impact on this species is low. In addition, the species' known location at the Waterways is not currently proposed to be impacted by the project. Two potential risks (risks BH2 and BH4) included modifying, destroying or decreasing the availability of habitat and the introduction of invasive species. Pre-clearing surveys to relocate any plants within the project area (EPR B3 and B5) and comprehensive weed and disease hygiene measures (EPRs B5 and B6) will reduce these risks so that the overall impact to the species is anticipated to be low. Protocols for these measures will be included in the project CEMP.

Significant impact is not anticipated.

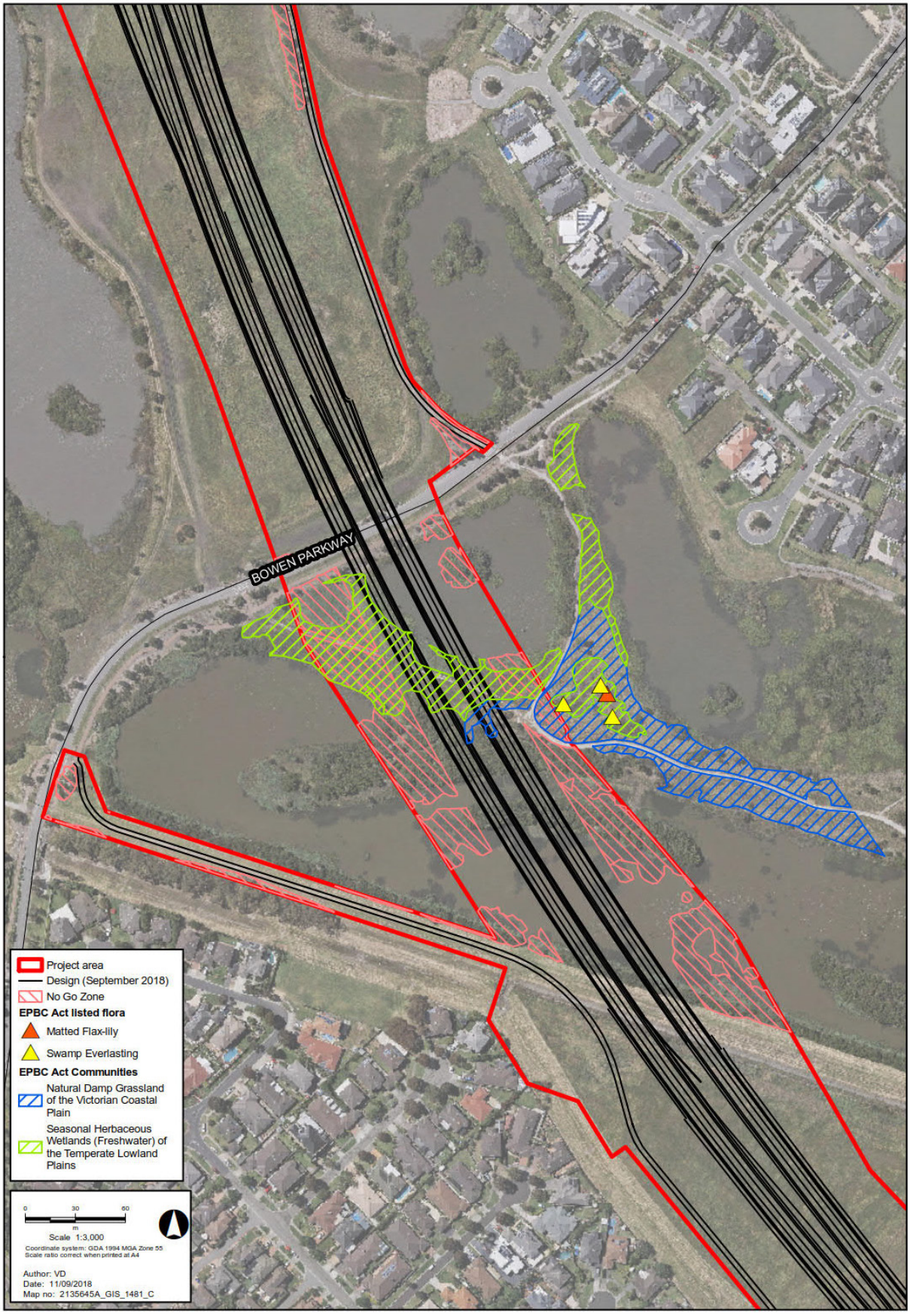

Figure 22.10 Mapping of EPBC Act listed flora and communities with no-go zones for the project

Threatened fauna

Twenty-two EPBC Act listed threatened fauna species were initially assessed for their potential to occur within or near the project area (excluding solely marine species), see Appendix C: *Flora and fauna impact assessment*. Of these, only four species were determined to have a likelihood of occurrence greater than 'low' at or nearby the project area:

- Australasian Bittern (High)
- Curlew Sandpiper (Moderate)
- Australian Painted Snipe (Low-moderate)
- Grey-headed Flying Fox (Moderate).

Anticipated impacts on fauna include direct loss of a small amount of habitat. A number of other less direct impacts may result from the project and are described in Chapter 10: *Biodiversity*. Those relevant to some of the EPBC Act listed species are fragmentation, habitat degradation, increased noise and light disturbance, and road collisions with traffic. Through delivery of the project in accordance with the EPRs, the impacts to threatened fauna species likely to occur within or near the project area are anticipated to be minor. Fauna-sensitive lighting design, and a multi-function fauna barrier (noise, light and mortality reduction) will also minimise impacts to fauna and their habitat (EPR B1, B2 and B4).

One key threatening process listed under the EPBC Act, 'land clearance' is relevant to the listed species. The project is unlikely to exacerbate any other relevant threatening processes.

An assessment against the significant impact criteria was undertaken for each species and is summarised below along with any required mitigation measures. The full significant impact criteria assessments can be found in Appendix C: *Flora and fauna impact assessment*. Table 22.8 summaries the EPBC Act status, preferred habitat type and the maximum habitat loss anticipated from the project for each of the threatened fauna identified as having a likelihood of occurrence greater than 'low' in or around the project area. Figure 22.11 and Figure 22.12 show the distribution of habitat types in and around the project which support the identified EPBC Act listed threatened fauna.

Table 22.8 Summary of EPBC Act listed birds, their habitat type and expected habitat loss

EPBC Act listed birds	EPBC Act status	Transitional zone	Reeds and rushes	Emergent vegetation	Shallow water	Maximum habitat loss anticipated
Australasian Bittern	Endangered	X	X	X		0.57
Australian Painted Snipe	Endangered	X		X	X	0.23
Curlew Sandpiper*	Critically endangered and Migratory			X	X	0.02 (potential but not preferred habitat)*
Latham's Snipe	Migratory	X		X	X	0.23
Other migratory shorebirds (including Sharp-tailed Sandpiper)*	Migratory			X	X	0.02 (potential but not preferred habitat)*
TOTAL AREA MAPPED (ha) (see Waterbird study area mapping Figure 10.12 and Figure 10.13 in Chapter 10)		1.81	10.50	3.29	3.97	
PROJECT AREA (ha) (defined in Chapter 6)		0.26	0.47	0.02	0	
ANTICIPATED LOSS (ha)		0.21	0.34	0.02	0	

*Species which prefer large open areas of habitat. Unlikely to use habitat that does not have good visibility (e.g. small patches surrounded by reeds).

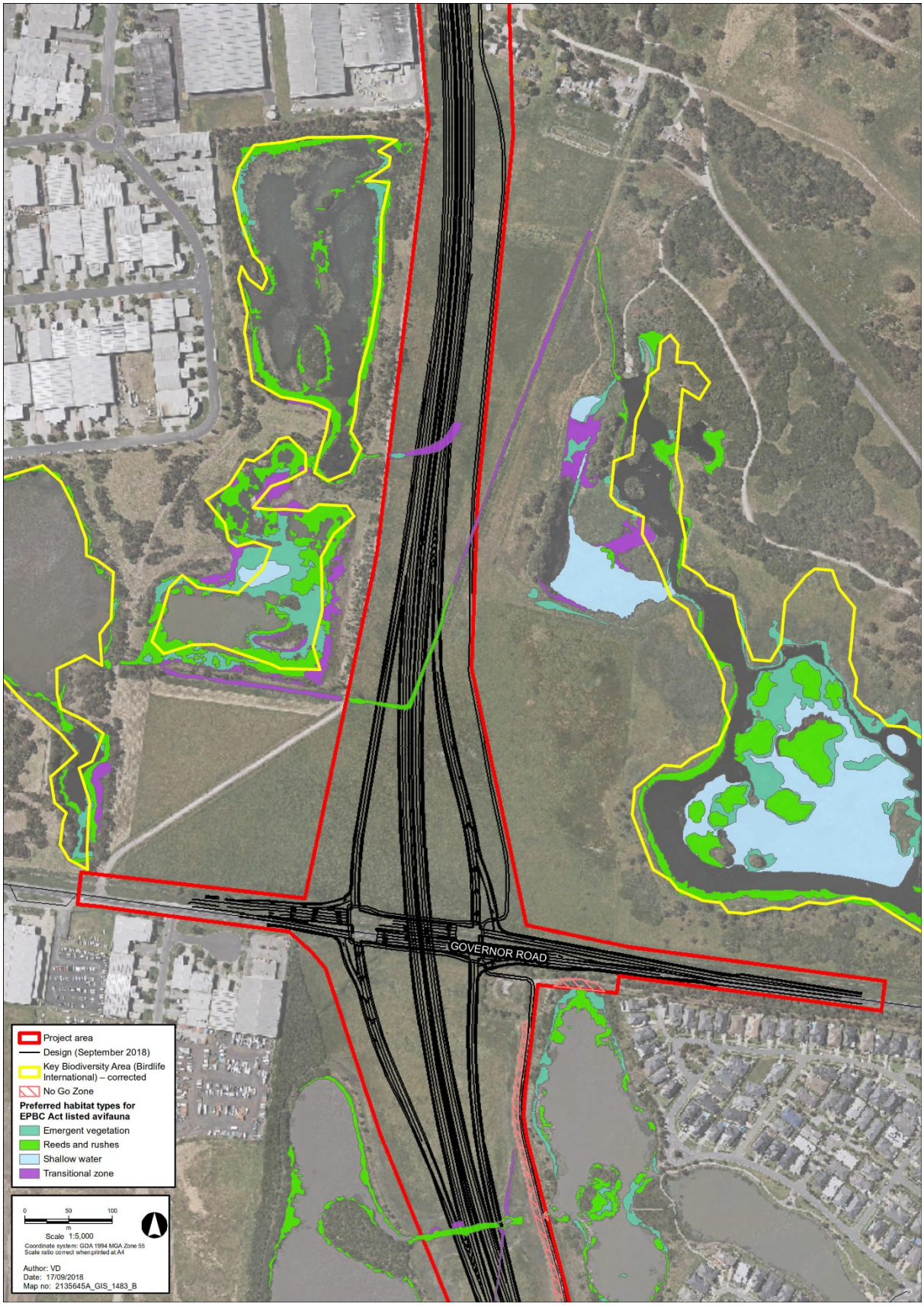

Figure 22.11 Preferred habitat for threatened and migratory birds (EPBC Act) in and around the project (north)

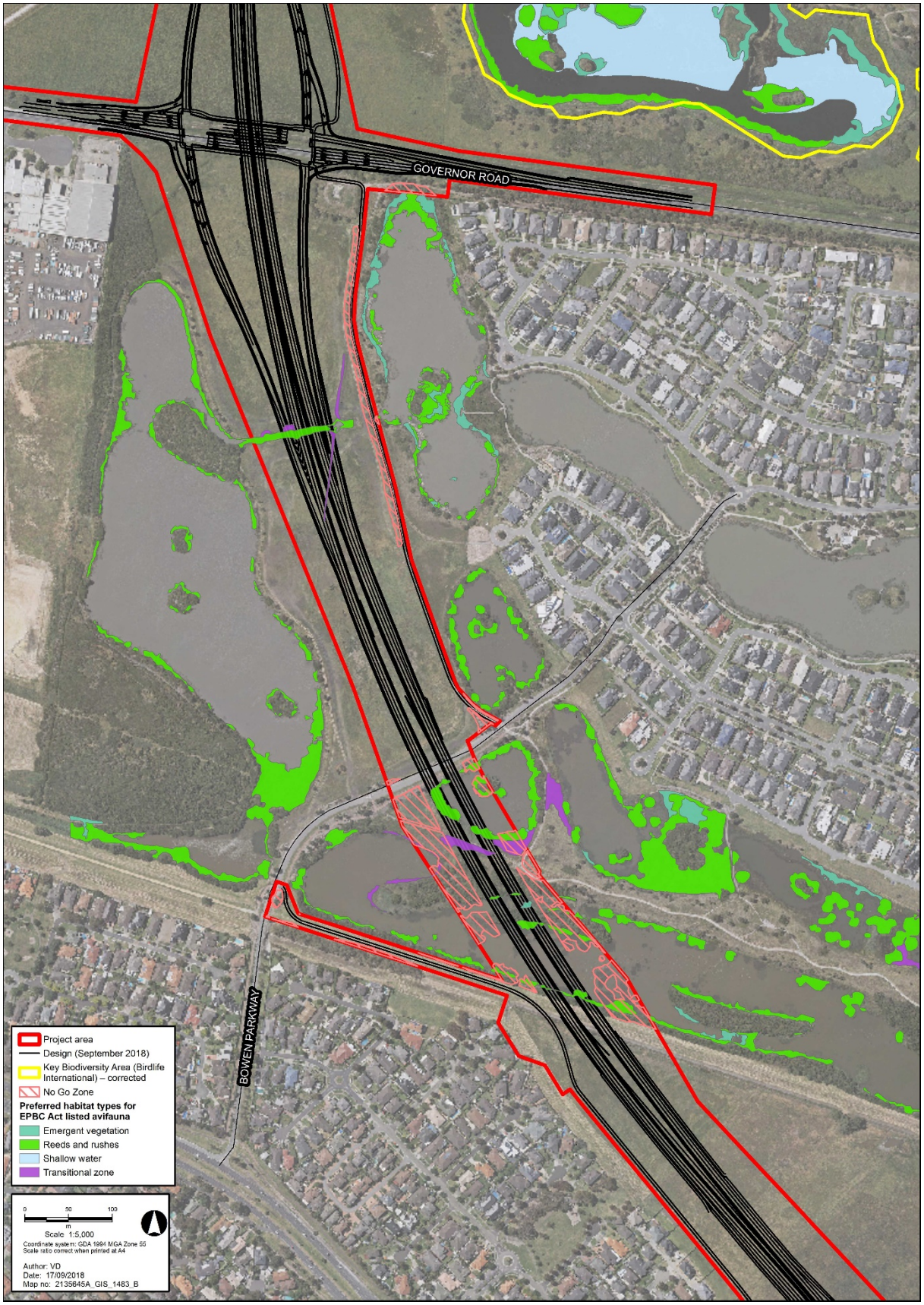

Figure 22.12 **Preferred habitat for threatened and migratory birds (EPBC Act) in and around the project (south)**

AUSTRALASIAN BITTERN *BOTAURUS POICILOPTILUS*

Listed as Endangered, the species is regularly recorded within the Edithvale-Seaford Wetlands, Woodlands Industrial Estate Wetlands, and Braeside Park. It has also been recorded at the Waterways Wetlands, although is likely to visit the habitat there only rarely. At the study area, it is recorded in low numbers only (usually only one bird). Direct impact on the habitat likely to be most valuable (the shallow wetland and surrounding reeds and rushes at Braeside Park Wetlands and Woodlands Wetlands) is not proposed. However, the significant impact criteria assessment identified several potential triggers, prior to the implementation of EPRs and additional controls. This is mostly due to a small amount of expected low quality habitat loss at the Waterways Wetlands (up to 0.57ha) and the potential for increased mortality from road collisions and disturbance through noise and light.

Loss of a small amount of low quality foraging, non-breeding habitat is unavoidable, however, with the implementation of various mitigation measures, the likelihood of significant impact upon this species is low. EPRs include a multi-function fauna barrier for noise and light, and fauna-sensitive lighting design near wetland habitat (EPR B1, B2 and B4). Rehabilitation and revegetation under the Mordialloc Creek bridge and targeted landscaping will also assist in maintaining connectivity and buffering this species' habitat (EPR B1 and B5). The species may occasionally utilise fauna connectivity culverts, with the proposed wetland revegetation at entrances (B1). Residual risks relate to the reduction in connectivity between wetland habitat areas, and some residual disturbance from operation of the road, which may lead to slightly decreased habitat use.

Significant impact is not anticipated.

CURLEW SANDPIPER *CALIDRIS FERRUGINEA*

The Curlew Sandpiper is listed as Critically Endangered as well as Migratory under the EPBC Act. It has been recorded within the Edithvale-Seaford Wetlands, Woodlands Industrial Estate Wetlands, and Braeside Park Wetlands but it is a non-breeding migrant to these areas and generally recorded in low numbers. Three birds were recorded at Braeside Park Wetlands in March 2018 during surveys completed for the project. A significant impact criteria assessment found the two greatest risks from the project (without mitigation) were removing, destroying or decreasing the availability of quality habitat, and interference with the recovery of the species. While there is no primary habitat for the species within the project area itself, there is the potential for impact on nearby habitat, particularly shallow water habitat at Braeside Park Wetlands through noise and light disturbance. With project delivery in accordance with EPRs B1, B2, B4, the likelihood of a residual significant impact on the Curlew Sandpiper is low. The relevant key mitigation required includes a multi-function fauna barrier to minimise operational noise and light, and fauna-sensitive lighting design near wetland habitat. Construction noise will be minimised and controlled through the CEMP.

Significant impact is not anticipated.

AUSTRALIAN PAINTED SNIPE *ROSTRATULA AUSTRALIS*

An infrequently recorded species, the Australian Painted Snipe is listed as Endangered under the EPBC Act. Despite the low frequency of records, local habitat (including habitat near the project area) may become important for this species when inland Australia is in drought. An assessment completed under the significant impact guidelines determined that the likelihood of any significant impact upon the species, prior to mitigation measures, is low. The species is unlikely to be substantially affected by the project as direct loss of low quality potential foraging habitat is minor (0.23 ha) and impact relating to fragmentation and degradation of habitat are not anticipated. Based on the assessment, no specific mitigation measures are required for this species. The Australian Painted Snipe may however benefit from the biodiversity and noise management EPRs and related measures which are being implemented to reduce risks to other fauna species (see Section 22.8.5).

Significant impact is not anticipated.

GREY-HEADED FLYING FOX *PTEROPUS POLIOCEPHALUS*

There is limited foraging habitat (i.e. eucalypts) for the Grey-headed Flying-fox (EPBC Act Vulnerable) within the project area and the species is unlikely to regularly forage within the project area itself. The species is however likely to fly over the study area and there is higher quality potential foraging habitat at Braeside Park and Woodlands Industrial Estate. The project may result in a small loss of potential foraging habitat (i.e. wooded areas) however much of the vegetation at the project area is grassland, wetland, or cleared, and higher quality potential foraging habitat occurs in the locality. Furthermore, indirect impacts from noise and light disturbance are unlikely to affect this species given the large area over which it forages. Based on the assessment, no specific additional controls are required but the species may benefit from EPRs B1, B2, B4 and associated controls which are being implemented to reduce risks to other fauna species as listed above.

Significant impact is not anticipated.

22.8.3 Listed migratory species

Impact on non-breeding habitat for migratory species which reduces birds' ability to forage effectively can force some individuals to travel further to find feeding and roosting sites. This could potentially cause an impact on their migration should they not have the ability to rest and replenish their condition prior to their onward migration.

Of importance to the assessment of impacts upon migratory species is whether habitat is 'important habitat'. Based on the definitions in the relevant guidelines:

- Edithvale-Seaford Wetlands is classified as 'internationally important' migratory shorebird habitat (also reflected by its Ramsar status).
- Shallow water wetland habitat at Braeside Park and Woodlands Wetlands may also constitute important habitat for migratory shorebirds as they occasionally support a proportion of the birds visiting the local area and are therefore part of the local habitat area for the migratory birds which visit Edithvale-Seaford Wetlands. However, based on the habitat present and the number of records, Woodlands Wetlands and Braeside Park Wetlands are only considered to be important habitat for the Sharp-tailed Sandpiper, Curlew Sandpiper, and Latham's Snipe. The other migratory shorebird species are generally only recorded in low numbers and use the habitat infrequently.
- Waterways Wetlands may classify as important habitat for Latham's Snipe. Waterways Wetlands is unlikely to constitute important habitat for any other migratory shorebirds, given the lack of suitable open shallow water or mudflat habitat.
- No important habitat is present for any of the other migratory birds (i.e. non-shorebirds) which may periodically occur at or near the project area. These species are recorded in low numbers only. The habitat near the project area is not within a region that supports an ecologically significant proportion of the population of the species, is not of critical importance to the species at particular life-cycle stages, is not at the limit of the species' range, and is not within an area where the species is declining.

Following on from the above, an assessment of the potential for significant impacts upon migratory species was completed.

Shorebirds

The migratory bird species with the potential to be affected by the works include several species considered to be migratory shorebirds. The assessment of important habitat for these species is more specific than the general migratory species definition and is detailed in EPBC Act Policy Statement 3.21 Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (DoEE 2017).

One key threatening process listed under the EPBC Act, 'land clearance' may be relevant to the listed species. However, for most of the species, no primary habitat would be cleared. The project is unlikely to exacerbate any other relevant threatening processes.

The migratory shorebirds with 'important habitat' present at or near the project area are discussed below. For all other migratory shorebirds, the project would not impact important habitat, or disrupt the lifecycle of an ecologically significant proportion of a population. Although important habitat is present for the Curlew Sandpiper at Braeside Park Wetlands and Woodlands Wetlands, the species is also listed as critically endangered, and was therefore assessed under these more stringent criteria (see assessment in previous section).

SHARP-TAILED SANDPIPER *CALIDRIS ACUMINATA*

Edithvale-Seaford Wetlands is recognised as being an internationally important site for the Sharp-tailed Sandpiper. It regularly (one in three years) supports over 1% of the Asian-Australasian Flyway population.

Shallow mudflat habitat, such as in the southern part of Edithvale is of particular importance to Sharp-tailed Sandpiper. There are records of the species at Woodlands and Braeside Park Wetlands, Waterways, and the Eastern Treatment Plant. Fifty-nine birds were recorded at Braeside Park Wetlands during surveys completed for this study, in March 2018. When present in the area, the local population is likely to move between several wetlands in the area to forage, depending on the local conditions. At the study area, Braeside Park Wetlands provides the highest quality habitat, although the species will also visit the other wetlands and may forage within the project area on occasion (such as when grassland is flooded).

No direct loss of primary habitat is proposed from the project however less direct impacts, including from noise and light, are possible. EPRs and the associated controls listed in Table 22.10 including the multi-function fauna barrier (EPR BHW1) and fauna-sensitive lighting design (EPR BHW2) will help to reduce these impacts such that the residual impact is low and not significant.

LATHAM'S SNIPE *GALLINAGO HARDWICKII*

Unlike most of the other listed migratory wader bird species known to occur in the area, Latham's Snipe is generally secretive, keeping to dense vegetation around wetlands. It is also generally observed in small groups or singly in its summer foraging habitat, instead of in large flocks. Given the above, habitat supporting only 18 birds is considered by the DoEE to be important to the species (DoEE 2017). There are numerous records of the species in the area, including at Edithvale-Seaford Wetlands, Braeside Park Wetlands, Woodlands Wetlands, and the Waterways Wetlands/Mordialloc Creek.

Some loss and fragmentation of foraging habitat, of up to 0.23ha, is likely, predominantly at Waterways Wetlands. No direct impacts proposed on the remaining, likely higher quality habitat at Braeside Park and Woodlands Wetlands, where the species is more often recorded. There is some potential for indirect impact on adjacent and nearby habitat, however this is unlikely to lead to a substantial reduction in use of the habitat, particularly with the mitigation proposed. Specifically, the multi-function fauna barrier would help reduce impact from noise and light upon habitat (EPR BHW1). Under the significant impact criteria, the likelihood of significant impact on this species is low.

Other migratory birds

For the other migratory birds of relevance to the project area, the project would not impact important habitat, or disrupt the lifecycle of an ecologically significant proportion of a population. These species, Glossy Ibis, Rufous Fantail, White-throated Needletail, and Fork-tailed Swift, are only ever recorded in low numbers in the area. No impact upon these species is anticipated.

22.8.4 Cumulative impacts

It is important to consider cumulative impacts of the project in combination with surrounding schemes. The cumulative assessment allows the project to identify and avoid the accumulation of habitat loss and environmental impacts from numerous individual projects which may otherwise be of little concern, however can be of increased significance when considered together.

A cumulative effects assessment (The Cumulative Effects Assessment Working Group et al. 1999) is expected to:

- *assess effects over a larger (i.e. "regional") area that may cross jurisdictional boundaries*
- *assess effects during a longer period of time into the past and future*
- *consider effects on Valued Ecosystem Components (VECs) due to interactions with other actions, and not just the effects of the single action under review*
- *include other past, existing and future (e.g. reasonably foreseeable) actions; and*
- *evaluate significance in consideration of other than just local, direct effects.*

For the assessment of cumulative impacts on this project, the following have been considered:

- Projects which occur in the immediate area of the project area (i.e. approx. 1km) which could increase noise, light and other indirect impacts, or lead to additional direct loss of local habitat.
- Projects in the broader locality (<10km) which have, may, or will reduce the quality or size of valuable wetland habitat (i.e. known to support the significant species which also occur at the project area).
- Projects which have already been approved, are being constructed, or which have been constructed within the last five years. Future unapproved projects (i.e. without defined impact areas and without detailed assessments available) would require too much guesswork to consider and are beyond the scope of this assessment unless reasonably foreseeable. Projects which occurred prior to five years ago are generally too old to be accurately considered. They have been considered part of the existing conditions of the site only, unless recent (<5 years) and with assessments publicly available. Note: the impact assessment has already considered the impact of the project with consideration of the built-up nature of the area (industrial, residential, green wedge etc.), historical change, and the sensitivity and population numbers/extents of the species and communities to be impacted. This examination of cumulative effects is for recent specific known projects only.
- Projects which have or may positively impact ecology, i.e. wetland creation projects or other ecological improvement projects such as those listed under regional/local plans in Section 3.3, are not considered. This is because it is difficult to foresee what positive outcomes may result for any particular significant ecological value from a project.

Outlined in Table 22.9 below is a summary of projects that have been considered to have potential to contribute to cumulative impacts associated with this project and relevant to MNES as well as the results of the assessment.

Table 22.9 Cumulative impact assessment

Project and description	Project impact summary	Cumulative impact
Level Crossing Removal Authority (LXRA) Edithvale and Bonbeach Removal of level crossings involving some vegetation removal and some local changes to groundwater	This project will have relatively minor local ecological impacts and local impacts on groundwater. No impacts on Edithvale Wetland and no impacts on migratory birds are anticipated. The works for this project (including haulage) may occur during construction of the Mordialloc Bypass (Freeway), however they will be short-term only.	Some cumulative vegetation and tree loss (although no threatened communities are proposed to be impacted by LXRA). As haulage along Edithvale Road will be avoided for this Project, no cumulative impacts upon the Ramsar wetland are anticipated. No other cumulative impacts anticipated.
Monash Freeway Upgrade (construction phase) Upgrade between Chadstone and Pakenham	Although several of the relevant significant species (including Australasian Bittern and Latham's Snipe) were recorded or assessed as being likely to occur in the study area in the referral submitted for the project it is unlikely that any habitat for these species has been or will be impacted, as the Monash Freeway Upgrade project requires minimal vegetation clearance (mostly infilling lanes). The only patch of native vegetation that may potentially be affected by the development is the Wet Verge Sedgeland to the north of the Monash Freeway bridge over Dandenong Creek.	Cumulative impacts are not anticipated.
Westall Road Extension (planning phase only) – extension from Westall Road/Princes Highway to the Monash Freeway	No assessments currently available. The extension may pass through or nearby water retention ponds however from an examination of E-Bird, no waterbird hotspots are present in the area.	Unknown however considered unlikely.
City of Kingston development of Chadwick Reserve (project phase unknown)	No information available.	Unknown, although (based on preliminary assessments) considered unlikely.
Moorabbin Airport Master Plan (planning phase only)	Not available but likely to be minor and not involve impacts to wetlands. Unlikely to increase noise and light impacts although no assessment is yet available.	None anticipated although as the projects are still in the planning phase this would need to be assessed by Moorabbin Airport.
Kingswood Dingley Village (planning phase only) Proposed residential development approximately 700m east of project area in the north	Not available, likely to involve tree and some wetland removal (unlikely to support significant species). Wetland creation unlikely to be designed to support species of significance.	Unknown, although (based on preliminary assessments) considered unlikely.
Cumulative impact summary		
No projects have been identified which are likely to lead to significant cumulative impacts upon the EPBC Act listed species and communities identified in this assessment.		

22.8.5 Mitigation and residual impacts

The impact assessment provided in this Chapter has informed the identification of required mitigation and assessment of residual impacts on MNES. Table 22.10 provides a summary against each of the relevant threatened species and communities of the recommended mitigation (and relevant EPR for delivery) and the residual impacts. Mitigation is linked to relevant EPRs to indicate the mechanism of delivery and enforcement. Full details of mitigation, management and monitoring, including relevant EPRs are provided in Appendix C: *Flora and fauna impact assessment*. Certainty of the effectiveness of mitigation has been considered and is reported in Table 22.10 alongside the residual impact. EPRs are linked to the mitigation listed to indicate the requirement whether it be specific guidance to be applied e.g. lighting or noise criteria, or as a means to provide greater certainty on commitments of the proponent to deliver such as fauna barriers.

In order to measure the effectiveness of mitigation proposed within the EES and EPRs, construction and operational monitoring will take place. EPR B6 relates to the operational monitoring of weed management effectiveness and that of the fauna barriers and culverts including identification of any areas for improvement or repair. This would cover a period of five years following commissioning of the project and gives greater certainty of the long-term effectiveness of related measures.

The key mitigation measures have been discussed in this impact assessment section 22.8 of the Chapter against each species, community and Ramsar wetland to indicate the specific management measures required to achieve acceptable environmental outcomes and avoid significant impacts on MNES.

Most of the mitigation measures relating to MNES concern the management of construction impacts and include minimising vegetation loss for the project and specific measures to be included within the CEMP. Chapter 23: *Environmental Management Framework* lists all EPRs related to the project along with a description of those referenced in this Chapter.

The EPRs listed in this Chapter are also contained within Chapter 10: *Biodiversity* and Chapter 16: *Surface water and hydrology.* While MRPA retains the accountability for achieving the objectives of the EPRs, the contractor will be responsible for the management of the mitigation measures through the application of their Environmental Management System (EMS). The responsibility for implementing appropriate management measures to achieve the objectives stated in the EPRs during the operational phase of the project is with VicRoads.

In some instances, additional project-specific environmental management measures have been recommended to reduce risk to water, catchment values and hydrology. Residual risks to water, catchment values and hydrology and associated controls that will require ongoing management in accordance with the objectives of the relevant EPRs are summarised below:

- provide maintenance handbook to clearly set out maintenance requirements of the infrastructure so that all stormwater infrastructure is functioning at design capacity during high rainfall (EPR W2)
- provide adequate spill containment storage in the drainage system so that spilled fuel will not arrive at the downstream waterway system (EPR W1)
- provision of bio-retention system to further remove pollutants discharging into the water sensitive receptors (EPR W1).

In some instances, additional project-specific environmental management measures have been recommended to reduce risk to biodiversity values. Residual risks to biodiversity and associated controls that will require ongoing management in accordance with the objectives of the relevant EPRs are summarised below where relevant to MNES. These are also listed against the relevant MNES species or community in Table 22.10:

- Refinement of impact footprint at detailed design and construction phase, to further reduce vegetation to be removed and add to no-go zones (EPR B3).
- Minimisation of impacts at the Waterways and restoration of substrate and revegetation under the bridge to maintain the connectivity of seasonal herbaceous wetlands (EPR B1).
- Reinstating of landform and substrate at bridge after construction to be defined in the CEMP (EPR B5).
- Additional monitoring and management is required where the project occurs adjacent to the Waterways Wetlands, Braeside Wetlands, and Woodlands Wetlands, including pre-clearing surveys within the Waterways Wetlands to identify any additional significant flora. Salvage and relocation of EPBC Act and FFG Act listed species if required (considered unlikely to be required) (EPR B5).
- No-go zones mapped and to be delivered at Mordialloc Creek and Waterways Wetlands (EPR B3).

- Swale design (e.g. bio-retention systems) to minimise changes to existing surface flow and quality conditions at important habitat areas (specifically Woodlands and Waterways) (EPR W1).
- Implement fauna sensitive lighting design guidelines as recommended in Appendix C: *Flora and Fauna Impact Assessment.* Barriers, directional lighting and/or plantings to prevent light spill across habitat/sites of ecological value and lighting located away from sites of ecological value wherever practicable (EPR B2).
- Edithvale Road (through the Edithvale Wetlands) not used for hauling equipment and materials (EPR B4).
- Noise management plan to include consideration of ecological values and noise mitigation will offer reduced disturbance to fauna (EPR NV1, NV2, B4). Avoidance of noisy works near the Wetlands where possible, however If construction works occur near the Wetlands between September and March (the breeding season), then monitoring of birds to occur before and at regular intervals during construction to assess disturbance and minimise effects from noisy works where practicable (EPR B4).
- Threatened species and ecological communities to be included in the CEMP for example weed management at the Waterways Wetlands to protect the Swamp Everlasting (EPR B5).
- Multi-function fauna barrier to minimise acoustic and light disturbance to the key wetland habitats (EPR B1). A 2m barrier is proposed. Further information, including noise modelling for the barrier, is provided in Section 10.8.2 of Chapter 10: *Biodiversity*. The multi-function fauna barrier would also force bird species to alter their flight path above road traffic.
- Chain mesh fencing to form a barrier to force larger-sized birds to fly over the road. This would not provide noise or light mitigation. Mesh fencing would incorporate a solid material or fine rabbit-proof mesh at the base, to prevent small fauna moving through it. The top wire would be marked to prevent bird collisions. MRPA has included the multi-function fauna barrier south of the Parks Victoria office in favour of the chain mesh fence as it provides additional acoustic and light spill protection.
- Planting on the embankment, as outlined on the Landscape Concept Plan in Attachment III: *Maps and figures*, would help direct bird flight above the roadway.
- Modified culverts and barriers to reduce road mortality in key areas (EPR B1). More specific information on fauna barrier types and locations is provided in Chapter 10: *Biodiversity* and Appendix C: *Flora and fauna impact assessment*.
- Bio-retention systems and spill containment to prevent polluted runoff entering the wetland habitat, see Chapter 16: *Surface water and hydrology* (EPR W1).
- Financial incentive provided to tenderers to seek further minimisation of vegetation losses, through alterations to design and construction methodology (EPR B3).

Table 22.10 Mitigation and summary of residual impact on MNES

MNES		Identified in referral letter by DoEE?	Summary of key mitigation	Summary of residual impact and certainty
Edithvale-Seaford Ramsar wetland		Yes Additional work completed since referral include further groundwater and surface water modelling.	Edithvale Road not used for haulage (EPR B4). Spill containment and bio-retention systems (EPR W1).	No impact to ecological values anticipated. No significant impact.
FLORA	Matted Flax-lily	No Additional work completed since referral includes further targeted flora survey.	Not required.	Species occurs near the project area however no significant impact from the project is anticipated.
	River Swamp Wallaby Grass	No Additional work completed since referral includes further targeted flora survey.	Not required.	Although given a 'moderate' likelihood of occurrence in the Preliminary flora and fauna assessment (WSP 2017), the species was subsequently considered unlikely to occur following a lack of observation during several surveys of wetland areas within the study area. No impact assessment required.
	Swamp Everlasting	No Additional work completed since referral includes further targeted flora survey.	Weed monitoring and control at Waterways wetlands to be included within the CEMP (EPR B5). Pre-clearing survey and relocation if required to be undertaken in compliance with the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) and by a suitably qualified ecologist, to be included in the CEMP as contained in EPR B5.	Species occurs near the project area however no impact from the project is anticipated.
	Swamp Fireweed	No Additional work completed since referral includes further targeted flora survey.	Not required.	If present, species unlikely to be significantly impacted.
	All other EPBC Act listed flora	No Additional work completed since referral includes further targeted flora survey.	Not required.	Other EPBC Act listed flora species considered unlikely to occur. This is based on habitat assessment and repeated surveys and visits to the project area.

MNES		Identified in referral letter by DoEE?	Summary of key mitigation	Summary of residual impact and certainty
FAUNA	Australasian Bittern	Yes Additional work completed since referral includes further bird surveys and detailed habitat mapping.	Refinement of impact footprint at detailed design and construction phase, to further reduce vegetation to be removed and add to no-go zones (EPR B3). Multi-function fauna barrier to mitigate disturbance and road mortality (EPR B1). Revegetation of wetland vegetation (including in swales and under the bridge) to buffer habitat and/or maximise connectivity (EPR B1). Fauna-sensitive lighting design for areas of the project near key wetlands and Braeside Park (EPR B2). Fauna connectivity culverts (EPR B1) not relied upon as a key measure but may occasionally be used, so revegetation of culvert entrances important to maximise this. Ongoing management of fauna connectivity measures will be confirmed in a management plan in accordance with EPR B6. A noise management plan will be provided in the CEMP (which must be implemented) to manage construction noise in accordance with EPA Publication 1254 and EPA Publication 480 (EPR NV2). EPR NV1 also sets the project objective noise levels which must be achieved during operation and includes provision of noise barriers. These measures will contribute to mitigating disturbance effects on fauna including migratory and threatened birds (also see EPR B4).	Minor residual impact possible however based on the current design this is not considered to constitute a significant impact upon the species. Residual uncertainty relates to barrier and lighting design, which are not yet finalised, as well as the residual impact of habitat fragmentation which cannot be avoided. With the current barrier design (2m), which will provide substantial noise mitigation, residual cumulative effects of disturbance and fragmentation are not considered to constitute a significant impact.
	Australian Fairy Tern	Yes Additional work completed since referral include further bird surveys and detailed habitat mapping.	Not required.	Species unlikely to occur in the study area. Impact assessment not required.
	Australian Painted Snipe	No	Not required.	Significant impact not anticipated, species unlikely to be affected by Project.

MNES		Identified in referral letter by DoEE?	Summary of key mitigation	Summary of residual impact and certainty
	Curlew Sandpiper	Yes Additional work completed since referral include further bird surveys and detailed habitat mapping. Species was recorded at Braeside Park wetlands during surveys in 2018.	Refinement of impact footprint at detailed design and construction phase, to further reduce vegetation to be removed and add to no-go zones (EPR B3). Multi-function fauna barrier provision to mitigate operational disturbance and mortality (EPR B1). Fauna-sensitive lighting design (EPR B2). A noise management plan will be provided in the CEMP (which must be implemented) to manage construction noise in accordance with EPA Publication 1254 and EPA Publication 480 (EPR N2). EPR NV1 also sets the project objective noise levels which must be achieved during operation and includes provision of noise barriers. These measures will contribute to mitigating disturbance effects on fauna including migratory and threatened birds (also see EPR B4).	Minor residual impact possible but significant impact upon the species is not anticipated. Residual uncertainty relates to barrier and lighting design, which are not yet finalised. Current barrier design (2m high) will provide substantial noise mitigation, although some increase from existing background noise is still anticipated (see Chapter 12: *Noise and vibration*). Cumulative residual disturbance impacts are considered unlikely to result in habitat avoidance by this species.
	Eastern Curlew	Yes Further investigation and habitat mapping completed after referral submission has indicated that the species has a low likelihood of occurrence in the area, and that the habitat near the project area is sub-optimal (the species is predominantly estuarine).	None required.	No impact anticipated as species is unlikely to occur in study area.
	Eastern Dwarf Galaxias	No	None required.	Species unlikely to occur in study area. Impact assessment not required.
	Grey-headed Flying-fox	No	None required.	Significant impact not anticipated, species unlikely to be affected by Project.
	Growling Grass Frog	No	None required.	Species not present in study area despite several repeated surveys. Species unlikely to occur. Impact assessment not required.

MNES	Identified in referral letter by DoEE?	Summary of key mitigation	Summary of residual impact and certainty
Natural Damp Grassland of the Victorian Coastal Plains	No	None required.	Minor residual impact on this community is anticipated – loss of 0.04 ha. Not considered a significant impact.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Yes Project would clear up to 0.24 ha of this community. An earlier assessment conservatively assumed presence of a much larger extent of the community, however subsequent survey and mapping has indicated that much of the area no longer meets the criteria for this community. More details are provided in Appendix C: *Flora and fauna impact assessment*.	Refinement of impact footprint at detailed design and construction phase, to further reduce vegetation to be removed and add to no-go zones (EPR B3). Reinstating of landform and substrate at bridge after construction to be defined in the CEMP (EPR B5). Financial incentive provided to tenderers to seek further minimisation of vegetation losses, through alterations to design and construction methodology (EPR B3). Revegetation to occur under bridge to maximise connectivity at the Waterways wetlands (EPR B1).	Minor residual impact on this community is anticipated – loss of 0.24 ha. Not considered a significant impact.
Migratory Birds	Yes – Sharp-tailed Sandpiper, Latham's Snipe and Curlew Sandpiper. Additional work completed since referral include further bird surveys and detailed habitat mapping. Sharp-tailed Sandpiper and Curlew Sandpiper were recorded at Braeside Park wetlands during surveys in March 2018.	Refinement of impact footprint at detailed design and construction phase, to further reduce vegetation to be removed and add to no-go zones (EPR B3). Multi-function fauna barrier provision to mitigate operational disturbance (EPR B1). Fauna sensitive lighting design (EPR B2). A noise management plan will be provided in the CEMP (which must be implemented) to manage construction noise in accordance with EPA Publication 1254 and EPA Publication 480 (EPR N2). EPR NV1 also sets the project objective noise levels which must be achieved during operation and includes provision of noise barriers. These measures will contribute to mitigating disturbance effects on fauna including migratory and threatened birds (also see EPR B4).	Minor residual impact anticipated but this is not considered a significant impact. Residual uncertainty relates to barrier and lighting design, which are not yet finalised. Current barrier design (2m high) will provide substantial noise mitigation, although some increase from existing background noise is still anticipated. Cumulative residual disturbance impacts are considered unlikely to result in habitat avoidance by migratory birds.

22.8.6 Offsetting

The project is a controlled action under the EPBC Act and the associated referral decision letter identified several MNES with the potential to be significantly impacted. It also stated the requirement for further survey and assessment for these values to determine the likely impacts. The impact assessment (Appendix C: *Flora and fauna impact assessment)* completed in accordance with the relevant Commonwealth guidelines concluded that without specific EPRs and mitigation there was a potential for MNES to be significantly affected. Through detailed assessment, incorporating several additional surveys, and through design of a comprehensive strategy of EPRs with additional controls for the project, residual impacts upon MNES are expected to be minor and not significant (see Table 22.10).

As such, Commonwealth Offsets in accordance with the Offsets Policy (DSEWPaC 2012) are not proposed. Native vegetation offsetting will still be undertaken under the Victorian offsetting system (refer to Chapter 10: *Biodiversity* and Appendix C: *Flora and fauna impact assessment*).

22.9 ENVIRONMENTAL PERFORMANCE REQUIREMENTS (EPRs)

Environmental performance requirements (EPRs) have been developed to avoid, manage and mitigate potential biodiversity and surface water impacts, reducing residual risks to acceptable levels. EPRs referenced in this Chapter are provided within Chapter 10: *Biodiversity* and Chapter 16: *Surface water and hydrology,* while a full list of EPRs are available within Chapter 23: *Environmental management framework.*

22.10 CONCLUSIONS

Three types of MNES are relevant to the Mordialloc Bypass (Freeway). These are the Edithvale-Seaford Ramsar Wetland, listed threatened species and communities, and migratory species. The likely impacts upon MNES have been assessed for this EES. Species assessed include migratory birds, particularly Latham's Snipe and Sharp-tailed Sandpiper, three threatened bird species (Australasian Bittern, Curlew Sandpiper and Australian Painted Snipe), Grey-headed Flying Fox and two threatened flora species (Swamp Everlasting and Matted Flax-lily). Two critically endangered EPBC Act communities will also be impacted and have been assessed.

Residual risks which will require ongoing management have been identified, however with the mitigation proposed and the project EPRs in place, significant impacts upon MNES are not anticipated.

Some of the key mitigation measures for MNES include bio-retention systems and spill containment (particularly for the Ramsar wetland), multi-function fauna barriers and other measures to protect habitat from noise and light impacts, fauna-sensitive lighting design, landscaping and other measures to maintain connectivity and buffer habitat, and additional weed management near important vegetation. Focus has been placed on maintaining the values of the important habitat that the project passes near, as well as minimising the footprint of the project.