Technical Memorandum

27 April 2022

To	Bilal Khan (GeelongPort)	**Tel**	(03) 5247 0200
Copy to	Rhys Armstrong, Lana Griffin (GHD)	**Email**	craig.grabham@ghd.com
From	Craig Grabham	**Ref. No.**	12559567
Subject	EES referral for the Geelong Hydrogen Hub – terrestrial ecology assessment		

1. Introduction

GHD Pty Ltd (GHD) is engaged by GeelongPort Pty Ltd (GeelongPort) to support the preparation of environmental referral documents in relation to the proposed development of the Geelong Hydrogen Hub at the Port of Geelong. GeelongPort is seeking to undertake the following referrals to the relevant agencies:

– **Environmental Effects Statement (EES) referral** to the Victorian Minister for Planning and the Department of Environment, Land, Water and Planning (DELWP) under the *Environment Effects Act 1978* (EE Act)
– ***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) self-assessment**, and potentially a referral under the same Act to the Commonwealth Department of Agriculture Water and Environment (DAWE)

1.1 Purpose of this report

This memorandum provides a desktop and fieldwork assessment of terrestrial ecological values within the project area to support and inform the environmental referral documents.

1.2 Project overview

GeelongPort propose to develop a facility at Port of Geelong to import liquid ammonia, produce hydrogen and nitrogen by ammonia decomposition (or cracking over a catalyst), and distribute hydrogen to potential offtake users within the Port of Geelong as well as in wider Victoria. Use of hydrogen for these industrial processes will present a strong offset for gas production and consumption needs. The site layout highlights the key process buildings, pipeline routes and structures, and allows for future expansion or alternative applications for the ammonia/hydrogen (Figure 1). The proposed site for the facility comprises approximately 7.5 hectares of land that is wholly owned by GeelongPort. The key project components comprise:

– New ammonia import berth as an extension of Refinery Pier in Corio Bay
– Transfer pipeline to an onshore storage facility
– Onshore storage facility for liquid ammonia (60 m diameter storage tank(s))
– Catalytic cracking plant(s) to decompose ammonia into hydrogen and nitrogen
– Onshore distribution pipelines to potential industrial users either within the Port of Geelong or in adjacent industrial zones
– Vehicle refuelling facility (hydrogen)
– Carpark

An options assessment was undertaken for alternative berth layouts to accommodate future imports of ammonia. The preferred berth layout is located within the existing dredge pocket and therefore no capital dredging is required.

1.3 Project scope

The scope included a desktop and preliminary field assessment of ecological values known or predicted to be present within both the broader referral area and actual project area to determine likely impacts to terrestrial ecological values, particularly MNES. The assessment included the following tasks:

- Description of the methods used during the investigation
- Summary of the desktop assessment and survey results
- Description of ecological values known or predicted to be present within the referral area
- Description of the likelihood of occurrence of conservation significant flora and fauna and communities
- Identification of project constraints including likely environmental legislative implications of the proposed works, if any, under the EPBC Act, Victorian *Planning and Environment Act 1987*, EE Act, *Flora and Fauna Guarantee Act 1988* (FFG Act), *Wildlife Act 1975* and *Catchment and Land Protection Act 1994*
- Recommendations for how the proposed works could avoid/minimise impacts on ecological values, based on the detailed design and need for further surveys if required
- Summary and conclusions, including recommended next steps for the project

1.4 Project area

For the purposes of this assessment, the term project area refers to the site layout as described in Section 1.2 and shown in Figure 1. The project area is located within the Victorian Volcanic Plain Bioregion, Port Phillip and Westernport Catchment Management Authority (CMA) area and City of Greater Geelong Local Government Area.

This report also assesses values within a 10 km buffer of the project area, which is a broader area than the expected zone of impact. The additional information captured has been used to provide context to determine the significance of ecological features identified within the study site (for example, whether they are part of a larger area, or whether there are potential impacts on ecological features outside the project area). The 10 km buffer area was not assessed in the field; however, a couple of areas adjacent to the project area were considered in the field assessment due to their potential values and the risk of incidental impacts from the project, including a section of the natural shoreline adjacent to the proposed carpark on Shell Parade.

1.5 Limitations

This technical memorandum: has been prepared by GHD for GeelongPort and may only be used and relied on by GeelongPort for the purpose agreed between GHD and GeelongPort as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than GeelongPort arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

- *The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report. Marine species are not included in this assessment. Marine fauna including birds, mammals and reptiles are addressed in a separate technical memorandum*

- *Included a field assessment for flora and native vegetation; a field assessment for fauna was not completed. The field assessment was restricted to the project area footprint for buildings/areas and the road reserve for the proposed pipes/utilities alignments, unless stated otherwise. A number of areas were not assessed due to being unlikely to have any terrestrial values or due to the areas not being approved for access (see* Figure 4*).*
- *Did not include an assessment against the Guidelines for the removal, destruction and lopping of native vegetation (DELWP 2017), which would typically support the application for a planning permit under the Planning and Environment Act (1987)*
- *The field assessment was limited to vascular plant species (ferns, conifers and flowering plants) and terrestrial vertebrate fauna. It did not include any non-vascular flora (e.g. mosses, liverworts, lichens), fungi, or terrestrial invertebrates, except where listed threatened species are known or are suspected to occur*
- *Included a field investigation as part of the ecological assessment during spring, which is considered a suitable time of year for conducting botanical assessments. However, some native flora are still difficult or impossible to locate or identify due to a lack of reproductive material and/or the seasonal nature of some species. Additional native species may be recorded at the site at other times of the year. Therefore, it is considered possible that some threatened flora may be present but were not detected during the survey because of its timing. This limitation is somewhat overcome by consideration of records from the Victorian Biodiversity Atlas (VBA) databases, which span all seasons and many years.*
- *Involved the use of Collector for ArcGIS mapping application to record site information. This mapping tool was accurate to within ten metres on site.*
- *Did not involve any targeted surveys for rare or threatened flora, although did include identification of flora that were fertile and/or flowering at the time of the field investigations. It was beyond the scope of this assessment to employ more detailed flora survey techniques.*

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared

LEGEND

- Hydrogen Off Take Route Options
- Ammonia Import Pipeline
- Road and Power Utilities
- Building/area
- Ammonia Ship
- Fence
- Concept layout footprint

Paper Size ISO A4

0 50 100 150 200

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GeelongPort Hydrogen Facility EES Referral

Project area location and components

Project No. **31-12559567**
Revision No. **0**
Date **27 Apr 2022**

FIGURE 1

G:\31\12559567\GIS\Maps\Deliverables\Ecology\12559567_001_ProjectAreaLocation_A4L_Rev0.mxd
Print date: 27 Apr 2022 - 10:31

Data source: GHD, 2021;Vicmap; 2021. ESRI, World Imagery, 2021. Created by: fcarve

2. Methods

2.1 Desktop Assessment

A desktop assessment of ecological values known or predicted to be present within the broader referral area and actual project area was undertaken to consider likely impacts to terrestrial ecological values, particularly MNES. This included recent information from the following databases and spatial datasets:

- The Victorian Biodiversity Atlas (VBA) for flora and fauna recorded within a 10 km buffer of the site (VBA curated by DELWP) (DELWP 2021a)
- The Protected Matters Search Tool (PMST), which predicts the occurrence of Matters of National Environmental Significance (10 km buffer of the site) (DAWE 2021a)
- NatureKit Maps – which provide modelled mapping of extant and pre-1750 Ecological Vegetation Classes (EVCs) (maintained by DELWP) (DELWP 2021b)
- Native Vegetation Information Management (NVIM) systems maps – which provide Location mapping, the Current Wetland Layer, the Strategic Biodiversity Score and the Native Vegetation Condition Score for the project area (maintained by DELWP) (DELWP 2021c)
- Aerial imagery of the project area and project area to identify ecological values and land use history.
- Within this report, the conservation status of a species is defined in accordance with the provisions of relevant state legislation and its regulations and amendments including the EPBC Act, FFG Act and *Flora and Fauna Guarantee Amendment Act 2019*.

2.2 Site Assessment

A botanical assessment was undertaken at the site by GHD botanist Stacey Harwood on the 20th of October 2021. The botanical assessment aimed to ground truth desktop information in order to clarify the location of remnant patches of native vegetation, non-native vegetation and scattered trees with the project area. The assessment aimed to map the extent and general condition of native vegetation within the project area, including:

- Identifying EVCs
- Recording the location of rare, threatened and/or protected flora
- Recording the location of any listed ecological communities
- Identifying significant weed species and infestations, including those declared under relevant state and national legislation, policy or strategy, e.g. *Catchment and Land Protection Act 1994* (CaLP Act) and the National Weeds Strategy.

All botanical fieldwork was undertaken in accordance with GHD's Permit to take Protected Flora under the *Flora and Fauna Guarantee Act 1988* (FFG Act; permit no. 10009910).

2.3 Nomenclature and conservation status

2.3.1 Flora

Common and scientific names for plants follow the Victorian Biodiversity Atlas (VBA) (Version 3.2.8).

Conservation status was determined in accordance with the Commonwealth EPBC Act, the Victorian FFG Act, and the A*dvisory List of Rare or Threatened Plants in Victoria – 2014* (DEPI 2014).

Native vegetation is defined in the Victoria Planning Provisions as "plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses". For the purpose of the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017), native vegetation is classified into two categories, a **Patch** of vegetation or a **Scattered Tree**:

– A **Patch** of native vegetation is either:
  - An area of native vegetation where at least 25% of the total perennial understorey plant cover is native
  - Any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy
  - Any mapped wetland included in the Current wetlands map (available on DELWP online mapping tools)
– A **Scattered tree** is a native canopy tree that does not form part of a patch

Other forms of vegetation include:

– **Planted native vegetation**, i.e. non-indigenous native species and areas of revegetation
– **Scattered native plants**, i.e. patches of vegetation dominated by introduced species, where less than 25% of the total perennial understorey plant cover is native.
– **Non-native vegetation,** i.e. vegetation that comprises introduced flora

2.3.2 Vegetation communities

Native vegetation in Victoria is mapped in units known as Ecological Vegetation Classes (EVCs). EVCs are described according to a combination of floristic, life form and ecological characteristics, and through an inferred fidelity to particular environmental attributes.

Each EVC occurs under a common regime of ecological processes within a given biogeographic range and may contain multiple floristic communities.

Other vegetation types that may occur in Victoria include vegetation communities listed as threatened under the EPBC Act and/or the FFG Act. These have separate vegetation classification systems, each of which is also separate to the EVC classification system. As such, any single patch of native vegetation occurring within the subject site (or anywhere in Victoria) will be classifiable as a particular EVC and may also be separately classified as a different threatened ecological community under the EPBC Act, and/or as another vegetation community under the FFG Act.

2.3.3 Fauna and fauna communities

Unless otherwise noted, common and scientific names for fauna follow the VBA database (Version 3.2.6).

The conservation significance of fauna was determined in accordance with the EPBC Act and the Victorian FFG Act.

The EPBC Act and the FFG Act list a number of threatened fauna communities, at a national or state scale, respectively. Fauna communities known or potentially occurring within the study area are only considered if they are listed under one or more of these Acts.

2.3.4 Weeds

The *loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants* is a listed key threatening process under the EPBC Act. In addition, *Invasion of native vegetation by 'environmental weeds*', is a listed potentially threatening process under the FFG Act.

During the field surveys, a list of all flora species observed within the study site was created. This includes environmental weeds, noxious weeds listed under the *Catchment and Land Protection Act* 1994 and Weeds of National Significance. All such weed species are listed in Section 3.2.2.

3. Results

3.1 Project area description

The topography of the project and surrounding area is highly modified due to the industrial history of the area. The ground surface is generally flat with a gentle slope downward towards Corio Bay.

Cuthbertson's Creek (Rollerama Drain) lies to the south of the proposed site and drains towards Corio Bay. Rollerama Drain collects surface runoff form Site 1 and immediate upgradient industrial areas.

Oyster Bay Creek (Refinery Channel) lies to the north of the proposed site, and also drains towards Corio Bay, towards Corio Bay. This waterway collects surface runoff from the upstream catchment, cooling water from the refinery and surface runoff from adjacent land (northwest of the site).

The majority of the project area has a long history of industrial land use. Soil material across the project area is generally composed of top fill material and underlying Quaternary sediments to depths ranging between 1 to 2 m below ground level, with silty clay and sandy clay underlying these sediments at deeper depth. The majority of the land at Site 1 has been engineered and is subject to historical filling. Illegal dumping may have occurred as majority of Site 1 has been unused for decades. The eastern portion of Site 1 is reported to have been landfilled with municipal solid waste to reclaim swampy coastal land around the original Oyster Cove. The landfill was operated until 1979 and was capped with about a metre of silty clay and sand.

The soils fronting Corio Bay at Site 4 has high probability (very high confidence) of occurrence of acid sulfate soils. There is a low probability (very low confidence) of occurrence of acid sulfate soils at Site 1,2 and 3.

The local surficial geology comprises Quaternary sandy clay and clay underlain by the Moorabool Viaduct Sands formation containing calcareous sand, clayey sand, quartzite, ferruginous sand and gravel.

Current and historical land use of the project area and surrounds is displayed in Appendix A.

3.2 Flora

The VBA has records of 980 species of flora within 10 km of the project area. These records include 519 native species, 429 introduced species and 32 species that are native but non-indigenous to the area.

The field assessment identified 49 species within the project area, including nine native species, 33 introduced species and seven species that are native but non-indigenous to the area or that have been planted in the project area.

3.2.1 Threatened flora

Forty-eight rare or threatened plants have been recorded on the VBA within 10 km of the project area (Appendix B). Eleven species were identified by the PMST as species that are considered likely to occur, or likely to have suitable habitat occurring in the project area. Thus, a total of 59 species identified for the project are listed as threatened under the EPBC Act, the FFG Act, and/or are considered rare or threatened in Victoria:

– Nineteen species listed under the EPBC Act
– Fifty-four species listed under the FFG Act

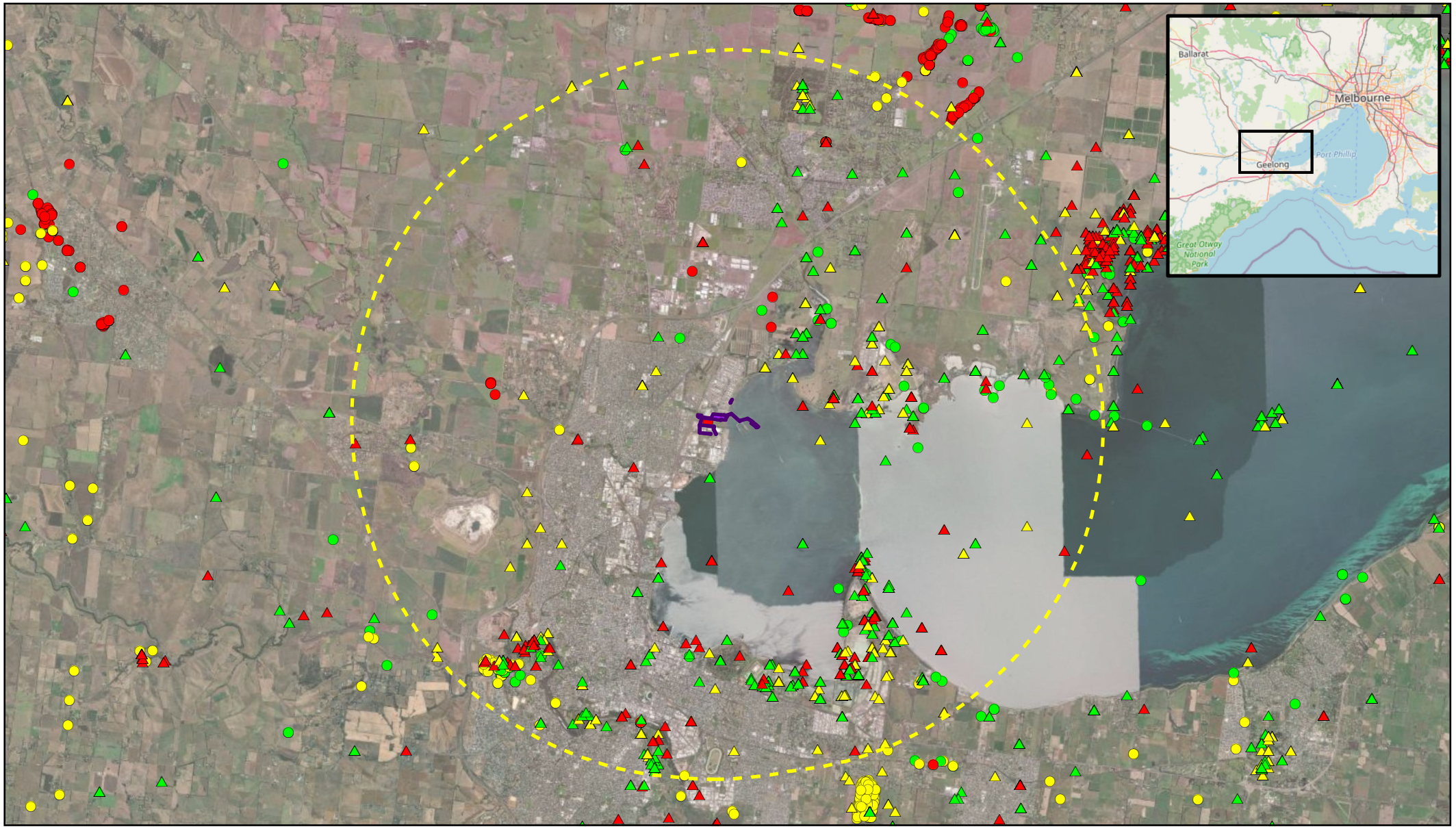
Of these 59 rare and threatened flora records, 10 species were considered possible to occur, 43 species considered unlikely to occur, and 6 species considered highly unlikely to occur (Appendix B) Assessment of a species' possible occurrence was based on the potential for suitable habitat onsite, and recent records on the VBA within 10 km of the project area. Suitable habitat in the proposed works area may include inland watercourses; estuarine flats; saline soils; sandy, sandy loam or basalt derived soils; brackish wet or moist soils, and coastal grasslands, woodlands and heathlands. An assessment of suitable habitat available in the project area was completed during the field assessment.

One species identified in the desktop assessment has been previously recorded within the project area. *Diuris basaltica* (Small Golden Moths) was recorded in 1998 within a survey area encompassing part of the project area (Figure 2). However, this species occurs in basalt plains grassland and no suitable remnant habitat was identified during the field assessment within the project area.

The field assessment identified two species listed under the FFG Act, but that are not indigenous to the locality, within the project area: *Eucalyptus leucoxylon* subsp. *megalocarpa* (Large-fruit Yellow-gum) and *Melaleuca armillaris* subsp. *armillaris* (Giant Honey-myrtle). There are no legislative requirements for these non-indigenous species.

The field assessment did not identify any indigenous threatened species within the project area, nor are any threatened flora considered likely to occur due to the limited extent of remnant native vegetation and highly modified nature of the site.

Just outside the project area, one location was identified during the field assessment as potentially providing suitable remnant habitat for threatened flora: the natural shoreline parallel to the proposed carpark (referred to here-on as the Shell Parade natural shoreline), which potentially contains EVC 9 Coastal Saltmarsh. The Shell Parade natural shoreline was unable to be accessed during the field assessment and was therefore only observed from a distance. Therefore, if the project proposed to complete any works in this area, a field assessment would be recommended to assess the presence and suitability of habitat for threatened species.



LEGEND

Concept layout footprint
10km buffer

VBA Fauna
- EPBC Listed
- FFG Listed
- Vic Advisory Listed

VBA Flora
- EPBC Listed
- FFG Listed
- Vic Advisory Listed

Paper Size ISO A4

0 1 2 3 4

Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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Project Area

Project No. **31-12559567**
Revision No. **0**
Date **27 Apr 2022**

FIGURE 2

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Print date: 27 Apr 2022 - 10:39

Data source: GHD, 2021;Vicmap; 2021.DELWP, 2021. ESRI, World Imagery, 2021. Created by: fcarve

LEGEND

- Concept layout footprint
- Buffer 500m

VBA Fauna

- EPBC Listed
- FFG Listed
- Vic Advisory Listed

VBA Flora

- EPBC Listed
- FFG Listed
- Vic Advisory Listed

EVC 2005

- 132 Plains Grassland
- 163 Coastal Tussock Grassland
- 175 Grassy Woodland
- 302 Coastal Saltmarsh/Mangrove Shrubland Mosaic
- 55 Plains Grassy Woodland
- 9 Coastal Saltmarsh

Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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GeelongPort Hydrogen Facility EES Referral

Ecological Values Map

Project No. **31-12559567**
Revision No. **0**
Date **27 Apr 2022**

FIGURE 3

G:\31\12559567\GIS\Maps\Deliverables\Ecology\12559567_003_EcologicalValuesMap_A4L_Rev0.mxd Data source: GHD, 2021;Vicmap; 2021; DELWP, 2021. ESRI, World Imagery, 2021. Created by: fcarve
Print date: 27 Apr 2022 - 11:11

3.2.2 Noxious weeds

Six noxious weeds listed under the *Catchment and Land Protection Act 1994* (CaLP Act) in the Port Phillip and Westernport region were identified within the project area, five of which are also listed as Weeds of National Environmental Significance (WoNS) (Table 1).

Table 1 Noxious weeds

Scientific Name	Common Name	Listing
Foeniculum vulgare	Fennel	Restricted
Genista linifolia	Flax-leaf Broom	Regionally Controlled, WoNS
Lycium ferocissimum	African Box-thorn	Regionally Controlled, WoNS
Nassella neesiana	Chilean Needle-grass	Restricted, WoNS
Nassella trichotoma	Serrated Tussock	Regionally Controlled, WoNS
Opuntia sp.	Prickly Pear	Restricted, WoNS

3.2.3 Ecological vegetation classes

Remnant native vegetation in the project area has been mapped by DELWP at a scale of 1:25,000. Table 2 summarises the two EVCs that were once present in the project area within the Victorian Volcanic Plain bioregion. Figure 3 displays the modelled occurrence of EVCs within the project area.

Table 2 Summary of EVCs within the project area

EVC	EVC code	Biodiversity Conservation Status (BCS)
Grassy Woodland	175	Endangered
Coastal Saltmarsh	9	Vulnerable

The DELWP Benchmark for EVC 175: *Grassy Woodland* in the Victorian Volcanic Plain Bioregion describes EVC175 as a "variable open eucalypt woodland to 15 m tall or occasionally Sheoak/Acacia woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies" (DELWP, 2021e).

The DELWP Benchmark for EVC 9 *Coastal Saltmarsh* describes EVC 9 as occurring "on and immediately above marine and estuarine tidal flats and contains distinct floristic communities as bands or zones in the same location, depending on the positioning of the various floristic communities in relation to the saline environment. Consists of a range of life forms including succulent herbs, low succulent shrubs, rushes and sedges" (DELWP, 2021e).

Prior to the field assessment, land use history, aerial photos and Google Street View were considered together as an approximate indicator of site condition. Aerial photos taken between 1985 and 2021 indicate that the proposed works areas between Cuthbertson's Creek and reclaimed land south of Oyster Cove (Site 1) have remained unused for at least 36 years. Whilst imported topsoil at Site 1 associated with land reclamation and capping will have both cleared original vegetation and created an altered environment unsuitable for some native plants, native plant recruitment after disturbance remains possible if a suitable source of native propagules is present.

Grassy Woodland (EVC 175) is mapped within the Cuthbertson's Creek system. Since 1985, vegetation in the creek upstream of the site boundary has remained relatively thick with minimal disturbance, and this zone may provide propagules that move downstream (via wind or water) to recruit in both Cuthbertson's Creek and adjacent reclaimed land extending to Oyster Cove (Site 1).

Google street view shows aquatic vegetation in Cuthbertson's Creek at the intersection of St Georges Road and Seabeach road to be likely native, whilst grassy areas either side of the drain and roadsides are in majority non-native. Grassy tree and/ or shrubland seen in Site 1 could not be identified from photos and would require a site investigation to determine.

Coastal saltmarsh (EVC 9) is mapped within the proposed works areas. If present, this EVC would most likely occur in less disturbed coastal and estuarine flats, including coastal zones on the Corio Bay side of Shell Parade (Site 4), in vicinity of the northern extent of planned hydrogen pipeline. Google Streetview imagery suggests EVC9 may occur in the described area. Roadside mown grassy vegetation west of the roadside fencing on Shell Parade is unlikely to harbour native vegetation typical of this EVC.

Coastal saltmarsh (EVC 9) is also mapped as potentially present in Site 1. Whilst unlikely to currently occur on reclaimed land due to altered hydrology and topography, propagules from nearby vegetation may have recruited on low lying or sandy areas closer to the shoreline, if present. The proposed project components that may intersect this EVC include boil-off-gas refrigeration system, and ammonia storage, cracking and expansion facilities.

Based on this desktop review, a field assessment was therefore undertaken to determine the presence and extent of native vegetation within the project area.

EVCs within the project area

The field assessment identified one EVC within the project area:

– EVC 821 Tall Marsh, no bioregional conservation status available for the Victorian Volcanic Plain bioregion (VVP)

Approximately 0.023 ha of EVC 821 Tall Marsh was identified within the project area, occurring within Rollerama Drain, next to the H2 Truck Fuelling Site north of St Georges Rd and where St Georges Rd crosses over the drain (see Figure 3). The EVC was dominated by *Typha* sp. (Bulrush). The *Typha* sp. (Bulrush) was unable to be identified to the species level due to a lack of fresh reproductive material but is likely one of the native species and has been assumed as such. A description of the EVC is provided in Table 3.

Scattered native plants were identified within the project area at the east end of St Georges Rd, including *Acacia pycnantha* (Golden Wattle), *Einadia nutans* (Nodding Saltbush) and *Rytidosperma* sp. (Wallaby Grass).

Table 3 Vegetation types and descriptions with the project area

Vegetation type	Description	Characteristic Photo
EVC 821 Tall Marsh Bioregional Conservation Status: Unknown in the VVP bioregion	Patches consisted of either a high abundance of *Typha* sp. (Bulrush) or *Bolboschoenus* sp. (Club Sedge). Introduced species were present within the patches, including *Cotula coronopifolia* (Water Buttons), *Helminthotheca echioides* (Ox-tongue), *Persicaria maculosa* (Redshank), *Plantago lanceolata* (Ribwort) and *Populus alba* (White Poplar).	

EVCs adjacent to the project area

During the field assessment, a patch of native vegetation was identified on Site 1 north of the proposed site of the catalytic cracking plants:

– EVC 9 Coastal Saltmarsh, bioregional conservation status of Vulnerable within the VVP.

While outside the project area, this patch was mapped as part of the assessment due to its close proximity.

EVC 9 Coastal Saltmarsh was also identified as potentially occurring along the Shell Parade natural shoreline (see Figure 4, Shell Parade natural shoreline – potential native vegetation polygon), but was unable to be confirmed or mapped as approval to assess this section of the project area was not granted on the 20th of October, and so this advice is based on a brief visual assessment from the public road. A description of the EVC is provided in Table 4.

Table 4 Vegetation types and descriptions outside the project area

Vegetation type	Description	Characteristic Photo
EVC 9 Coastal Saltmarsh Bioregional Conservation Status: Vulnerable in the VVP bioregion	The patch consisted of a midstorey of *Atriplex cinerea* (Coast Saltbush) and understorey of *Disphyma crassifolium* subsp. *clavellatum* (Rounded Noon-flower) and *Suaeda australis* (Austral Seablite). Introduced species are present, including *Bromus diandrus* (Great Brome) and *Cenchrus clandestinus* (Kikuyu).	

3.2.4 Threatened ecological communities

Desktop Assessment

The PMST identified six EPBC Act-listed threatened ecological communities (TECs) that are known, likely to occur or may occur within 10 km of the project area:

- *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* (Critically Endangered)
- *Natural Damp Grassland of the Victorian Coastal Plains* (Critically Endangered)
- *Natural Temperate Grassland of the Victorian Volcanic Plain* (Critically Endangered)
- *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland* Plains (Critically Endangered)
- *Subtropical and Temperate Coastal Saltmarsh* (Vulnerable)
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Critically Endangered)

Based on native vegetation types mapped onsite and their associated bioregion, the following EPBC communities are unlikely to occur:

- *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* (Critically Endangered), due to lack of association with the mapped EVCs 175 or EVC 9 in this bioregion (DSEWPC 2011b)
- *Natural Damp Grassland of the Victorian Coastal Plains* (Critically Endangered), due to listing of contraindicators EVC 175 and strong halophytic species presence, likely occurring with very saline soils onsite (DoE 2015)
- *Natural Temperate Grassland of the Victorian Volcanic Plain* (Critically Endangered) due to lack of association with the mapped EVCs 175 or EVC 9 in this bioregion (DSEWPC 2011b)
- *Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland* Plains, due to listed contraindication with maritime influence (TSSC 2012)
- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Critically Endangered), as listing advice indicated that the works area is it is out of range of the mapped national extent (TSSC 2006)

Based on native vegetation types mapped onsite and the associated bioregion, the following EPBC community is more likely to occur:

– *Subtropical and Temperate Coastal Saltmarsh* (Vulnerable), due to EPBC listing advice including EVC 9 as an indicator of potential presence (DSEWPC 2011a). This community, if present would be most likely to occur west of fencing adjacent to Shell Parade, along the shoreline where the northern extent of planned hydrogen pipeline is currently placed. There is also potential for this community to occur in areas of Site 1 that are low lying and close to the coast, where Ammonia Cracking, expansion, storage tanks and Boil-off-gas refrigeration system are planned.

FFG Act-listed communities that are synonymous with the EVCs outlined above have the potential to occur within the project area.

Field Assessment

The field assessment did not identify any threatened ecological communities within the assessed project area. The patch of EVC 9 Coastal Saltmarsh occurring outside the project area, north of the catalytic cracking plants, was assessed against the key diagnostic characteristics and condition thresholds for *Subtropical and Temperate Coastal Saltmarsh*. While the patch does meet the key diagnostic characteristics of the ecological community, it does not meet the condition thresholds for EPBC listing due to the patch being < 0.1 ha.

There is also potential for *Subtropical and Temperate Coastal Saltmarsh* to be present along Shell Parade natural shoreline outside but adjacent to the project area. A field assessment of this area would be required to confirm the presence or absence of this threatened ecological community.

3.2.5 Non-native vegetation

Vegetation across the project area consists primarily of introduced species. The main project area at the eastern end of St Georges Rd is dominated by high threat weeds such as *Lycium ferocissimum* (African Box-thorn) and *Opuntia* sp. (Prickly Pear), along with common weeds such as *Bromus* spp. (Brome), *Galenia pubescens* var. *pubescens* (Galenia), *Medicago* sp. (Medic) and *Plantago lanceolata* (Ribwort) (Plate 1).

The H2 Truck Fuelling Site north of St Georges Rd is dominated by introduced vegetation, with the exception of Rollerama Drain, which contains EVC 821 Tall Marsh. The introduced vegetation is dominated by *Cenchrus clandestinus* (Kikuyu), *Bromus* spp. (Brome), *Galenia pubescens* var. *pubescens* (Galenia) and *Lolium perenne* (Perennial Rye-grass). *Eucalyptus cladocalyx* (Sugar Gum) is planted along the edge of the road (Plate 2).

The assessed road reserves within the project area also consisted primarily of introduced vegetation and planted trees and shrubs, including *Arctotheca calendula* (Cape Weed), *Brassica* sp. (Turnip), *Cenchrus clandestinus* (Kikuyu), *Eucalyptus tricarpa* (Red Ironbark), *Galenia pubescens* var. *pubescens* (Galenia), *Melaleuca armillaris* subsp. *armillaris* (Giant Honey-mrytle) and *Populus alba* (White Poplar) (Plate 3).

The Shell Parade proposed carpark appeared to consist primarily of a mixture of indigenous, non-indigenous and introduced plantings. This is consistent with an assessment completed in the area by AECOM (2020) (Plate 4).

Plate 1: Main buildings/areas footprint

Plate 2: H2 Truck Fuelling Site north of St Georges Rd

Plate 3: Madden Avenue road reserve

Plate 4: Shell Parade proposed carpark

LEGEND

- Concept Layout Footprint
- Not Assessed

Concept Design

- Buildings/areas
- Ammonia Ship
- Carpark
- Fence

Design - Pipes/Utilities

- Hydrogen Off Take Route Options
- Ammonia Import Pipeline
- Road and Power Utilities

EVCs

- 821 - Tall Marsh
- 9 - Coastal Saltmarsh
- Shell Parade natural shoreline - Potential native vegetation

Paper Size ISO A4

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

GeelongPort
GeelongPort Hydrogen Facility EES Referral

Native vegetation mapping

Project No. **31-12559567**
Revision No. **0**
Date **04 Nov 2021**

FIGURE 4

G:\31\12559567\GIS\Maps\Deliverables\Ecology\12559567_005_NativeVegetationMapping_A4L_Rev0.mxd
Print date: 27 Apr 2022 - 13:10

Data source: GHD, 2021;Vicmap; 2021; DELWP, 2021. ESRI, World Imagery, 2021. Created by: fcarve

3.3 Current wetlands

Based on DELWP's NVIM tool, there is a mapped current wetland at the western side of the project area (wetland ID 54381). The H2 truck fuelling site (Site 2) may overlap with this wetland which is shown in Figure 5. This mapped current wetland has the potential of being excluded from an assessment under the Guidelines (2017) based on Cuthbertson's Creek being permanently inundated. Further assessment into the hydrology of the site would be required. However, in the event the mapped current wetland was found to meet the criteria to be excluded, native vegetation has still identified as occurring within Cuthbertson's Creek: EVC 821 Tall Marsh (see Section 3.2.2).

3.4 Ramsar wetlands of international significance

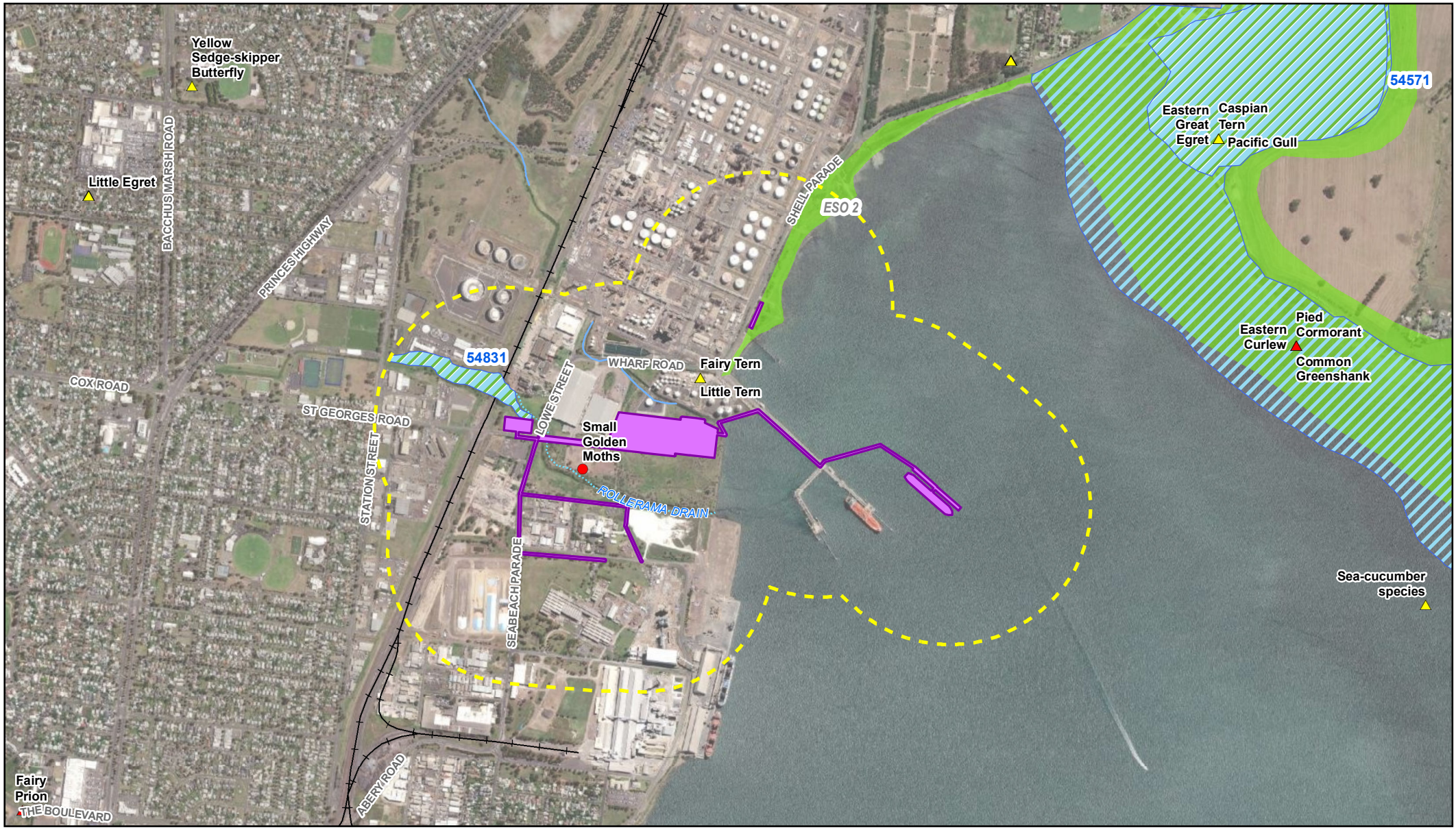
The PMST search identified one Wetland of International Importance which is the Port Phillip Bay (western shoreline) and Bellarine Peninsula. The project area is approximately 1,036 m from the proposed new ammonia import berth to the closest part of the Ramsar site .

3.5 Council Overlays

VicPlan mapping indicates that one City of Greater Geelong environmental council overlay is present within the project area, which is the Environmental Significance Overlay Schedule 2: High Value Wetlands and Associated Habitat Protection. Based on the statement of environmental significance, a permit is not required to remove, destroy or lop non-native vegetation, unless this vegetation is deemed to be of importance to:

– Maintain the ecological character of the site
– A species listed under JAMBA, CAMBA or the Bonn Convention
– A species listed in Schedule II of the *Fauna and Flora Guarantee Act 1988*
– A species listed as a threatened species in Victoria by DELWP

This environmental overlay is presented in Figure 5.



LEGEND

- Concept layout footprint
- Buffer 500m

VBA Fauna

- EPBC Listed
- FFG Listed
- Vic Advisory Listed

VBA Flora

- EPBC Listed
- FFG Listed
- Vic Advisory Listed

- Victorian Wetland Inventory
- Ramsar Wetland
- Environmental Significance Overlay - Schedule 2

Paper Size ISO A4

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GeelongPort

GeelongPort Hydrogen Facility EES Referral

Council overlays and DELWP mapped wetlands

Project No. 31-12559567
Revision No. 0
Date 27 Apr 2022

FIGURE 4

G:\31\12559567\GIS\Maps\Deliverables\Ecology\12559567_004_OverlaysAndWetlands_A4L_Rev0.mxd
Print date: 27 Apr 2022 - 11:49

Data source: GHD, 2021;Vicmap; 2021; DELWP, 2021. ESRI, World Imagery, 2021. Created by: fcarve

3.6 Fauna

3.6.1 Habitat types

The project area is located on the shoreline of Corio Bay, and is in close proximity to a Ramsar site and other recognised migratory and threatened bird species habitats (e.g. Limeburner's Bay area). A review of aerial photography for the areas intersected by the proposed project footprint identified the following:

- Road reserves including along St Georges Road, Greta Street, Madden Avenue and Seabeach Parade (C115) consisting of low quality habitat with grasses and scattered trees and shrubs. The majority of vegetation is non-native with some trees and shrubs planted. The majority of the area either side of the road is highly modified and appears maintained.
- Three minor watercourse – including an unnamed artificial drain (referred to as Oyster Bay Creek or the Shell Effluent Channel (Woodward Clyde 1997)) adjacent to the existing refinery plant, an unnamed manmade drainage channel at the eastern end of Greta St, and Cuthbertson's Creek. The Oyster Bay Creek drain at the point intersected by the proposed project footprint near Corio Bay is of low-quality habitat and does not appear to have any or minimal fauna habitat/vegetation. The manmade drainage channel on Greta St has some vegetation and may provide low quality habitat for frogs and aquatic fauna (Plate 5). Cuthbertson's Creek is intersected by the proposed project footprint near the corner of St Georges Road and Seabeach Parade. The drain in this area appears well vegetated and may provide habitat value for frogs and aquatic fauna (Plate 6).
- Open grassland and densely shrubbed areas occupy the proposed project footprint with admin services, load facilities and the ammonia cracking plant and storage areas within Lot 1 (Plate 7). The majority of the land at Lot 1 has been engineered and is subject to historical filling however has been has been unused for decades. The area proposed for the admin services and load facilities is highly modified, containing non-native vegetation. The type and condition of the fauna habitat for remainder of this area through to Corio Bay is unknown. Given the disturbance history and nearby land uses, it is unlikely to support important habitat for fauna species of conservation significance.
- Shoreline and near shore habitats which are intersected by the proposed hydrogen offtake route options appear modified with limited habitat opportunities for fauna species of conservation significance (Plate 8). These areas may provide some opportunities for migratory bird species or wetland and coastal bird species to loaf (rest) and forage along the shoreline, however these habitats are unlikely to provide roosting and breeding opportunities for fauna of conservation significance.

Plate 5: manmade drainage channel at the eastern end of Greta St

Plate 6: Highly vegetated Cuthbertson's Creek

Plate 7: Site 1 containing grassland and shrubland

Plate 8: Shoreline along Site 1

3.6.2 Database search results

A total of 485 terrestrial fauna species are documented to occur or predicted to occur, within the project area (i.e. within 10 km of the project area) (VBA and PMST). Of the terrestrial and aquatic fauna species identified within the project area, 89 are considered to be threatened and are listed under the EPBC Act and/or FFG Act:

– Forty-five species listed under the EPBC Act
– Eighty-three species listed under the FFG Act

Appendix C lists the threatened fauna species with previous records within the project area and/or identified as potentially occurring within the project area.

3.6.2.1 Fauna species of conservation significance

Based on the VBA species geographical mapping, two threatened fauna species were recorded within 500 m of the project area, which is the Little Tern (*Sternula albifrons*) and Fairy Tern (*Sternula nereis*). The Fairy Tern is considered vulnerable under the EPBC Act. Both species are considered critically endangered under the FFG Act. There is potential for both species to forage along the shoreline and further out over the bay, and also loaf along the shoreline, jetty and ship birthing facility. However, both species prefer to roost and nest on sand-spits, sandy beaches, sand bars within sheltered coastal or estuarine environments (DAWE 2021b/c), thus are unlikely to roost or breed within the project area.

3.6.2.2 Migratory species

Forty-five migratory bird species were identified by the VBA and PMST as known or likely to occur within 10 km of the project area (Appendix D).

– Eighteen species are listed under the EPBC Act
– Twenty-three species are listed under the FFG Act

There is limited habitat for migratory species within the project area. There is potential for migratory bird species to forage along the shoreline and over the bay, and also loaf along the shoreline, jetty and ship birthing facility. However, there are limited opportunities for breeding or roosting within the project area.

3.6.3 Fauna communities

No fauna communities listed under the EPBC Act or FFG Act are likely to occur within the project area.

4. Summary of key ecological values and potential impacts

There are several ways in which proposed project can interact with the terrestrial ecological values discussed in the above sections with potential impacts occurring both during the construction and operational phases. Table 2 provides a summary of the key ecological values, potential impacts and proposed mitigation measures to avoid and or minimise impacts to terrestrial ecological values.

Table 5 Summary of potential impacts

Ecological value	Potential impact description	Potential mitigation measures – next steps
Native vegetation	Approximately 0.23 ha of EVC 821 Tall Marsh is present within the project area footprint where it intersects with Cuthbertson's Creek. EVC 9 Coastal Saltmarsh is also present adjacent to the footprint north of the proposed catalytic cracking plants within the old landfill site.	Where possible, avoid and minimise impacts to patches of native vegetation. The detailed design should aim to avoid works within Cuthbertson's Creek. Construction should consider methods to avoid and minimise incidental impacts to adjacent EVC 9 Coastal Saltmarsh.
EPBC ecological communities	The *Subtropical and Temperate Coastal Saltmarsh* may occur. This community, if present, is mostly likely to occur along the Shell Parade natural shoreline adjacent to the proposed carpark.	Detailed design should avoid works along the Shell Parade natural shoreline. If works for the carpark are proposed outside the port zone, a field assessment is recommended.
Flora species of conservation significance	10 flora species were considered possible to occur within the project area based on a desktop assessment of potential habitats. Based on the field assessment, the project area is considered unlikely to support any threatened flora, with the potential exception of areas of EVC 9 Coastal Saltmarsh along the natural shoreline adjacent to Shell Parade.	Detailed design should avoid works along the Shell Parade natural shoreline. If works are to occur along the shoreline, a field assessment is recommended.
Fauna habitat	The habitat within the project area is of low quality and contains some unknown habitat values. The proposal may remove between 5 – 7.5 ha's of fauna habitat. The majority of habitat removal (c. 6 ha) would occur for the construction of the proposed admin services, load facilities and the ammonia cracking and storage areas within Site 1. The remaining habitat would be removed/modified for the construction of the hydrogen offtake and delivery routes and roads and powerlines.	Detailed design should minimise impacts to better quality habitat located along Cuthbertson's Creek.
Fauna species of conservation significance	There is potential for the removal of low quality and an unknown quality of fauna habitat, particularly for the construction of the proposed admin services, load facilities and the ammonia cracking and storage areas within Site 1.	As above.
Current wetlands	The H2 truck fuelling site, Lot 2 may overlap current wetland (ID 54381).	Avoid and minimise project impacts to Cuthbertson's Creek.

Ecological value	Potential impact description	Potential mitigation measures – next steps
Ramsar wetlands	The project area is located close to the boundary of the Ramsar wetland – Port Phillip Bay (western shoreline) and Bellarine Peninsula.	The assessment will need to consider the potential impacts of the project to the wetland, including the ecological character of the wetland.

5. Summary of relevant legislation

Table 3 outlines the potential legislative implications for the project that may result from the removal of native vegetation and/or fauna habitat within the project area.

Table 6 Potential ecological legislative requirements for this project

Key legislation Administered by	Relevance to project	Action required?
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)** Commonwealth Department of Agriculture, Water and the Environment (DAWE)	A referral to the Australian Government Environment Department Minister is required for any action/s that has, will have, or is likely to significantly impact a matter of national environmental significance (MNES). One of the six EPBC Act-listed communities identified by the PMST may occur adjacent to the project area. The desktop assessment identified three flora species and one fauna species listed under the EPBC Act that are known or likely to occur or may occur within the project area or surrounding the project area. Based on the field assessment, the flora species are considered unlikely to occur in the project area. The fauna species is also considered unlikely to rely on habitat within the project area. Forty-five migratory species listed under the EPBC Act are known or may occur within the project area or surrounding project area. The project is unlikely to significantly impact any migratory species. The project area is located close to the boundary of the Ramsar wetland – Port Phillip Bay (western shoreline) and Bellarine Peninsula. The proposed project is unlikely to significantly impact the ecological character of the wetland with regard to terrestrial ecological values.	*A referral under the EPBC Act is unlikely with regard to the MNES addressed within this report. Note that marine fauna including marine birds listed under the MNES will be addressed as part of the separate marine ecology technical memorandum.*
Catchment and Land Protection (CaLP) Act 1994 Victorian Department of Land, Water and Planning (DELWP)	The project has the potential to spread and/or introduce weeds during the proposed works.	*Weed management and hygiene protocols must be incorporated into a project-specific CEMP/EMP.*
Environment Effects (EE) Act 1978 DELWP	A referral to the Minister for Planning is required when a project could potentially have significant environmental effects, for example the potential long-term loss of a significant portion of habitat for a threatened species. The EE Act requirements will be addressed regarding the ecological values within the site including native vegetation following a site investigation.	*It is unlikely that this project will have significant environmental effects and require referral based on a review of ecological values.*
***Planning and Environment Act 1987* (P&E Act)** Greater Geelong Shire	Any proposed impacts to vegetation and/or native vegetation will require a planning permit under the Planning Scheme, and offsets may be required.	*Once the detailed design is confirmed, determine impacts to native vegetation, and planning permit and offset requirements.*

Key legislation Administered by	Relevance to project	Action required?
***Flora and Fauna Guarantee Act 1988* (FFG Act)** DELWP	A permit is required under the FFG Act if an FFG Act-listed threatened or protected species or threatened communities will be impacted on public land. The desktop assessment identified 16 flora species listed under the FFG Act that may occur within the project area. No threatened flora were identified during the field assessment, nor are they considered likely to occur, with the potential exception of habitat along the shoreline adjacent to proposed carpark. Two fauna species were recorded within 500 m of the project area, but are considered unlikely to depend on habitat within the project area.	*A field assessment is recommended if works are proposed along the Shell Parade natural shoreline within the area identified as potentially consisting of native vegetation.*
Wildlife Act 1975 and Wildlife Regulations 2002 DELWP	A Management Authorisation under the Act is required when native fauna need to be relocated during works (e.g. if fauna need to be removed from hollows during lopping or tree removal, or from trenches that are left open).	*Management Authorisation may be required if tree lopping or trench works are expected. This would be obtained at the time of construction.*

6. Recommendations

During the detailed design/construction phase, the following should be considered to reduce impacts to flora, fauna and communities at the proposed project area:

– Avoid and minimise impacts to Cuthbertson's Creek, which contains native vegetation and provides habitat for frogs, wetland birds and aquatic fauna
– Implement mitigation measures, such as fencing and control of run-off, to avoid and minimise the risk of impacting the patch of EVC 9 Coastal Saltmarsh adjacent to the project area
– Complete a further field assessment if works are proposed along the Shell Parade natural shoreline

Regards

Craig Grabham
Senior Scientist

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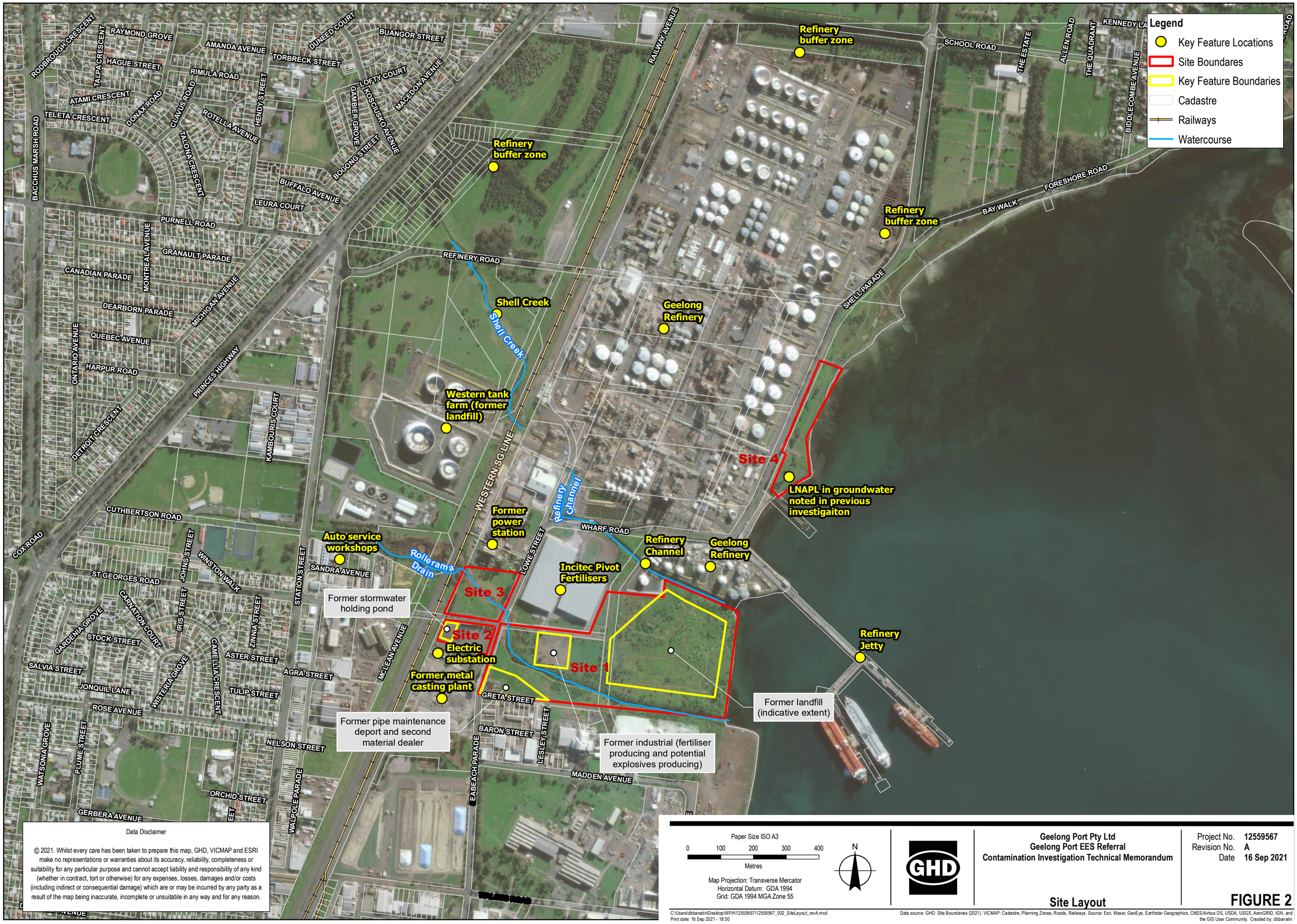
Appendices

Appendix A

Current and historical land use - project area and surrounding area



Data Disclaimer

© 2021. Whilst every care has been taken to prepare this map, GHD, VICMAP and ESRI make no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and cannot accept liability and responsibility of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred by any party as a result of the map being inaccurate, incomplete or unsuitable in any way and for any reason.

Paper Size ISO A3

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

GHD

Geelong Port Pty Ltd
Geelong Port EES Referral
Contamination Investigation Technical Memorandum

Project No. **12559567**
Revision No. **A**
Date **16 Sep 2021**

Site Layout

FIGURE 2

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Print date: 16 Sep 2021 - 18:50

Data source: GHD: Site Boundaries (2021). VICMAP: Cadastre, Planning Zones, Roads, Railways. Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: dbbanatin

Appendix B

Incidental flora identified in the project area

Key to Table:

FFG Act Code: en (endangered)

* : Introduced

: Non-indigenous native species outside its natural range (likely to be planted)

R : Restricted Weed

C : Regionally Controlled Weed

WoNS : Weed of National Significance

Scientific Name	Common Name	Listing
Native		
Acacia pycnantha	Golden Wattle	
Atriplex cinerea	Coast Saltbush	
Bolboschoenus sp.	Club Sedge	
Disphyma crassifolium subsp. *clavellatum*	Rounded Noon-flower	
Einadia nutans	Nodding Saltbush	
Eucalyptus spp.	Eucalypt	Planted
Eucalyptus tricarpa	Red Ironbark	Planted
Eucalyptus viminalis	Manna Gum	Planted
Melaleuca sp.	Honey-myrtle	Planted
Rytidosperma sp.	Wallaby Grass	
Sonchus spp.	Sow Thistle	
Suaeda australis	Austral Seablite	
Typha sp.	Bulrush	
Introduced		
Acacia saligna	Golden Wreath Wattle	*
Allium triquetrum	Angled Onion	*
Arctotheca calendula	Cape Weed	*
Asphodelus fistulosus	Onion Weed	*
Avena sp.	Oat	*
Brassica sp.	Turnip	*
Bromus catharticus	Prairie Grass	*
Bromus diandrus	Great Brome	*
Cenchrus clandestinus	Kikuyu	*
Cotula coronopifolia	Water Buttons	*
Dactylis glomerata	Cocksfoot	*
Eucalyptus cladocalyx	Sugar Gum	*
Eucalyptus leucoxylon subsp. *megalocarpa*	Large-fruit Yellow-gum	en #
Foeniculum vulgare	Fennel	* R
Fumaria sp.	Fumitory	*

Scientific Name	Common Name	Listing
Galenia pubescens var. *pubescens*	Galenia	*
Galium aparine	Cleavers	*
Genista linifolia	Flax-leaf Broom	* C WoNS
Helminthotheca echioides	Ox-tongue	*
Hordeum sp.	Barley Grass	*
Lolium perenne	Perennial Rye-grass	*
Lycium ferocissimum	African Box-thorn	* C WoNS
Malva pseudolavatera	Cretan Hollyhock	*
Medicago sp.	Medic	*
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	en # Planted
Nassella neesiana	Chilean Needle-grass	* R WoNS
Nassella trichotoma	Serrated Tussock	* C WoNS
Opuntia sp.	Prickly Pear	* R WoNS
Persicaria maculosa	Redshank	*
Phalaris aquatica	Toowoomba Canary-grass	*
Pittosporum undulatum	Sweet Pittosporum	# Planted
Plantago lanceolata	Ribwort	*
Populus alba	White Poplar	*
Prunus sp.	Prunus	*
Rumex sp. *(naturalised)*	Dock (naturalised)	*
Vicia sativa	Common Vetch	*

Appendix C

Rare or threatened flora species identified within 10 km of the project area by the VBA and PMST

Key to Table:

EPBC Act Codes: VU (Vulnerable), CR (Critically Endangered), EN (Endangered)

FFG Act Codes: cr (critically endangered), en (endangered), vu (vulnerable), r (rare)

: Non-indigenous native species outside its natural range (likely to be planted)

Source:

VBA Victorian Biodiversity Atlas

PMST Protected Matters Search Tool

Likelihood of occurrence:

- **POSSIBLE** (P) – Potentially suitable habitat occurs within project area and species' known range encompasses the project area. Species recorded historically within 10 km of the project area, and generally within the last 30 years
- **UNLIKELY** (U) – Species' known range encompasses the project area, but suitable habitat does not occur within project area, or occurs within project area but with generally low quality and quantity. Species recorded historically within 10 km of the project area, but generally not within the last 30 years
- **HIGHLY UNLIKELY** (HU) – No historical records of the species within 10 km of the project area and/or no suitable habitat within project area

Scientific Name	Common Name	EPBC Act	FFG Act	Count of Sightings	Last Record	Source	Habitat	Likelihood of occurrence
Acacia cupularis	Cup Wattle		cr #	1	1983	VBA	Grows in sand or sometimes in dunes or in loam or sandy clay in mallee communities. Mostly coastal or near coastal in its range, in Vic., known only from Wyperfeld, Little Desert (Walsh & Entwisle 1996).	U
Acacia rupicola	Rock Wattle		en #	1	1984	VBA	Restricted in Victoria to rocky areas around Mt. Arapiles and apparently the northern Grampians (Walsh & Entwisle 1996).	U
Acacia uncifolia	Coast Wirilda		en	4	1905	VBA	Occurs from Geelong to Wilsons Promontory, on coastal dunes or near saltmarsh, chiefly on calcareous sand and sandy loam soils. (Walsh & Entwisle 1996).	U
Allocasuarina luehmannii	Buloke		vu	1	2002	VBA	Usually growing in woodland with *Eucalyptus microcarpa*, on calcareous soils (Walsh and Entwistle, 1996).	U
Althenia marina	Sea Water-mat		cr	1	2010	VBA	Occurs in marine intertidal (mid-eulittoral) areas of western Port Phillip Bay on muddy substrates with *Zostera muelleri* and *Ruppia maritima*.	P
Amphibromus fluitans	River Swamp Wallaby-grass	VU				PMST	Confined to permanent swamps principally along the Murray River Between Wodonga and Echuca, uncommon to rare in the south probably due to alteration of habitat (Walsh and Entwisle 1994).	HU
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush		en	12	1994	VBA	Locally common on fringes of coastal and near coastal saltmarshes west from Wilsons Promontory (Walsh & Entwisle 1996). .	P
Avicennia marina subsp. *australasica*	Grey Mangrove		en	4	2003	VBA	Locally common on tidal mudflats from the western half of Port Phillip bay to Corner Inlet (Walsh & Entwisle 1996). .	P
Billardiera scandens s.s.	Velvet Apple-berry		en	1	1905	VBA	Apparently uncommon in Victoria, occurring chiefly in dry open-forests and woodlands in the north-east, with isolated occurrences near Eltham, Mt. Macedon, Hurstbridge, Eildon and Orbost (Walsh & Entwisle 1996). .	U
Caladenia pumila	Dwarf Spider-orchid	CR	cr			PMST	Previously known from a single population at Bannockburn, but not seen there since 1926. New population found in September 2009 at Inverleigh Conservation Reserve (DELWP, 2015)	HU
Callitriche umbonata	Winged Water-starwort		en	1	1904	VBA	Scattered and rare in western Victoria, in damp and swampy places (Walsh & Entwisle 1996).	U
Calotis anthemoides	Cut-leaf Burr-daisy		cr	2	1923	VBA	Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion.	U
Comesperma polygaloides	Small Milkwort		cr	1	1923	VBA	Occasional on heavier soils (clays, alluvium) supporting grassland and grassy woodland communities in central and south-western areas (Walsh & Entwisle 1996).	U
Correa alba var. *pannosa*	Velvet White Correa		en	1	1905	VBA	Occurring in coastal areas from the lower Glenelg River to Port Philip Bay, usually on calcrete soils (Walsh and Entwisle 1999).	U

Scientific Name	Common Name	EPBC Act	FFG Act	Count of Sightings	Last Record	Source	Habitat	Likelihood of occurrence
Corymbia maculata	Spotted Gum		vu #	1	2019	VBA	Occurring naturally north-west of Orbost (Walsh & Entwisle 1996).	U– outside of normal distribution, likely planted.
Cullen parvum	Small Scurf-pea		en	1	1924	VBA	A nationally endangered species, known in Victoria from a few locations in north-central and south-central areas where it grows mainly in grassland or grassy woodland (Walsh & Entwisle 1996).	U
Dianella amoena	Matted Flax-lily	EN	cr			PMST	Grasslands and grassy woodlands (Walsh & Entwisle 1994).	U
Diuris basaltica	Small Golden Moths	EN	cr	1	1998	VBA, PMST	Confined to the basalt plains of south-western Victoria, growing in native grassland and grassy woodland. Largely confined to road reserves (Jeans and Backhouse 2006). .	U
Diuris palustris	Swamp Diuris		en	1	1904	VBA	Scattered throughout western Victoria, frequently in swampy depressions within grassland or open woodland communities, probably now extinct in all or most former sites near Melbourne (Walsh & Entwisle 1994).	U
Dodonaea procumbens	Trailing Hop-bush	VU				PMST	Largely confined in Victoria to the south-west, with disjunct occurrences near Castlemaine, Skipton. Grows in low-lying often winter wet areas in woodland, low open-forest and grasslands on sands and clays (Walsh & Entwisle 1996).	U
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum		en	9	2019	VBA	North-eastern Metropolitan Melbourne distribution (Walsh & Entwisle 1996).	U- outside of normal distribution, likely planted.
Eucalyptus sideroxylon subsp. sideroxylon	Mugga		en	1	2015	VBA	In Victoria, confined to the Chiltern area, northern Warby Range and south of Winton (Walsh & Entwisle 1996).	U- outside of normal distribution, likely planted.
Euphrasia scabra	Rough Eyebright		en	1	1904	VBA	Formerly widespread but not common, in low-land and montane regions throughout Victoria. The species is now threatened with extinction and confined to a few sites in the eastern ranges among shrubs in sclerophyll forest, clearings or subalpine woodland (Walsh & Entwisle 1996).	HU
Glycine latrobeana	Clover Glycine	VU	vu	1	1905	VBA, PMST	Widespread but of sporadic occurrence and rarely encountered. Grows mainly in grasslands and grassy woodlands (Walsh and Entwisle 1996).	U
Heterozostera nigricaulis	Australian Grass-wrack		en	1	2010	VBA	Forms large meadows in shallow coastal waters to a depth of c. 15 m.	P
Heterozostera tasmanica	Eelgrass		en	2	2005	VBA	Locally common in shallow coastal waters to a depth of c. 8 m, in sandy soil.	P
Juncus revolutus	Creeping Rush		en	1	1993	VBA	Restricted to damp saline or subsaline communities near the coast, with a small number of outlying populations around saline lakes on the volcanic plains (Walsh & Entwisle 1996).	P
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	en	9	2002	VBA, PMST	Occurs in and around saline depressions on the Volcanic Plain where recorded from Portalington west almost to the South Australian border (Walsh and Entwisle 1994).	U

Scientific Name	Common Name	EPBC Act	FFG Act	Count of Sightings	Last Record	Source	Habitat	Likelihood of occurrence
Lachnagrostis robusta	Salt Blown-grass		en	1	1997	VBA	Occurs around margins of salt lakes and saline depressions mostly across the Volcanic Plain, with eastern outliers near Tooradin and Seaspray and a few sites west of the Grampians (Douglas, Natimuk areas).	U
Lepidium hyssopifolium	Basalt Peppercress	EN				PMST	Collected from scattered sites on the volcanic plain, but now much reduced from its former range and recorded recently only from e.g. Moorabool, Winchelsea, Bacchus Marsh, Woodend, Trentham. Most recent collections are from disturbed, rather weedy sites. One collection from near Port Fairy is noteworthy for its occurrence in a slightly saline estuary amongst saltmarsh and fringing sedgeland.	U
Leucochrysum albicans subsp. *tricolor*	White Sunray	EN	en			PMST	Very rare in Victoria, the only recent collections from volcanic grassland remnants in the Wickliffe, Willaura, Streatham, Inverleigh and Creswick districts. All other Victorian collections were made last century, from e.g. Mt Cole, the Grampians and the Port Fairy district.	HU
Malva preissiana s.s.	Coast Hollyhock		en	1	1993	VBA	Uncommon, growing on sand, mainly along the coast from Corner Inlet to Portland. Often in association with areas of high seabird activity.	P
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle		en #	8	2020	VBA	Mainly confined to near coastal sandy heaths, scrubs, slightly raised above saltmarsh, riparian scrubs, rocky coastlines and foothill outcrops eastwards from about Marlo. Occurrences to the west are naturalized (Walsh & Entwisle 1996).	U - outside of normal distribution, likely planted or naturalized. .
Nicotiana suaveolens	Austral Tobacco		en	1	1986	VBA	Widespread, particularly in drier inland areas, often in rocky places (Walsh & Entwisle 1996).	U
Olearia pannosa subsp. *cardiophylla*	Velvet Daisy-bush		en	1	1910	VBA	Rare in Victoria, known from dry open-forest, on shallow rocky soils near Wedderburn, Rushworth and in the Brisbane Ranges, and in coastal woodland near Anglesea (Walsh & Entwistle 1996).	U
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	cr	2	2013	VBA, PMST	Grows in grassland or open shrubland on basalt-derived soils west of Melbourne (Walsh and Entwisle 1999).	U
Poa billardierei	Coast Fescue		en	1	1905	VBA	Of scattered occurrence on coastal sand dunes from near Nelson in the far south-west to the NSW border, but infrequently collected in recent times and possibly being displaced by the superficially similar, introduced Marram-grass (*Ammophila arenaria* (L.) Link).	U
Podolepis linearifolia	Basalt Podolepis		en	2	1923	VBA	Usually grows on heavy clay soils in grasslands but also recorded for grassy woodlands, open forests and around swamps (Walsh and Entwisle, 1999)	U
Prasophyllum lindleyanum	Green Leek-orchid		en	1	1905	VBA	Occurs in more fertile soils of woodland or scrubby heath, but now localized and uncommon (Walsh & Entwisle 1996).	U

Scientific Name	Common Name	EPBC Act	FFG Act	Count of Sightings	Last Record	Source	Habitat	Likelihood of occurrence
Prasophyllum spicatum	Dense Leek-orchid	VU	cr	7	1934	VBA	Scattered mainly across southern Victoria but with several isolated occurrences in the Eastern Highlands and the western Goldfields. Found mainly in open forests, woodlands, heathy woodlands and heathlands. Soils are generally sand and clay loams that may be moist for at least part of the year (Backhouse & Jeanes, 1996).	U
Prasophyllum suaveolens	Fragrant Leek-orchid	EN	en	1	1924	VBA	Widespread but sporadic across Victoria, growing in heath and heathy woodland (Jeanes and Backhouse 2006).	U
Prostanthera nivea var. nivea	Snowy Mint-bush		vu #	5	2019	VBA	Localised across southern Victoria in coastal heathland and near-coastal heathy forest on sandy soils.	U
Pterostylis chlorogramma	Green-striped Greenhood	VU	en			PMST	Restricted to open fertile grassy plains and now almost extinct (Walsh & Entwisle 1996).	HU
Pterostylis cucullata	Leafy Greenhood	VU				PMST	Largely confined to shrubland and open woodland associated with granite outcrops.(Walsh and Entwisle 1999).	HU
Ptilotus erubescens	Hairy Tails		cr	1	2008	VBA	Occurs across southern Victoria, growing in heathy Woodland. Recorded for few locations, but probably more widespread than current records suggest (Jeanes and Backhouse 2006).	U
Rhagodia parabolica	Fragrant Saltbush		vu #	12	2019	VBA	Widely distributed but disjunct, mostly occurring in small groups in coastal areas, rarely inland.(Walsh and Entwisle 1999). Widespread across southern Victoria, and extending into montane areas of the Eastern Highlands and East Gippsland. Grows in closed scrublands on the landward slopes, swales and tops of coastal sand dunes. Also grows in open forests on moist slopes, on seasonally inundated inland river flats, and in other riparian habitats. On the coast it grows in deep, well-drained sandy loams while inland it favours heavier sandy loams (Backhouse & Jeanes 1995).	P
Rumex crystallinus s.s.	Glistening Dock		en	1	1982	VBA	Widely distributed but disjunct, mostly occurring in small groups in coastal areas, sometimes near inland watercourses (Jones 1994).	P
Rutidosis leptorhynchoides	Button Wrinklewort	EN	en	2	1923	VBA, PMST	Occasional on relatively fertile soils supporting grassland and woodland communities in northern and western Victoria, but not in mallee areas.(Walsh and Entwisle 1999).	U
Rytidosperma richardsonii	Straw Wallaby-grass		en	1	1961	VBA	Confined to a few steep rocky slopes and broad ridges between Sunbury and Geelong. (Walsh and Entwisle 1999).	U
Salsola tragus subsp. *pontica*	Coast Saltwort		en	4	2005	VBA	Recorded from only few sites along margins and drying beds of Wallawalla, Hattah and Lalbert lakes (Walsh & Entwistle 1996).	U
Senecio cunninghamii var. *cunninghamii*	Branching Groundsel		en	1	1904	VBA	In Victoria, confined to basaltic grasslands between Rokewood and Melbourne (Walsh and Entwisle 1999).	U

Scientific Name	Common Name	EPBC Act	FFG Act	Count of Sightings	Last Record	Source	Habitat	Likelihood of occurrence
Senecio macrocarpus	Large-headed Fireweed	VU	cr	2	1998	VBA, PMST	In Victoria largely confined to remnant Themeda grasslands on loamy clay soils derived from basalt from near Melbourne west to Skipton area. Also known from auriferous ground near Stawell.	U
Senecio psilocarpus	Swamp Fireweed	VU				PMST	Widespread in semi-arid often slightly saline areas, in the north and north-west, occasionally coastal (Walsh and Entwisle 1999).	U
Swainsona behriana	Southern Swainson-pea		en	1	1926	VBA	Occurs on heavy-sometimes winter wet soils as well as dry rocky soils. Common on embankments or escarpments and woodland to open forest to 15 m tall of less flood-prone (riverine) watercourse fringes, principally on levees and higher sections of point-bar deposits (Walsh & Entwisle 1996).	U
Thelymitra epipactoides	Metallic Sun-orchid	EN	en			PMST	Largely confined to Themeda grasslands on loamy clay soils derived from basalt near Melbourne, west to Skipton area. Also known from auriferous ground near Stawell. (Walsh and Entwisle 1999).	U
Thelymitra gregaria	Basalt Sun-orchid		cr	1	1925	VBA	Rare in Victoria, restricted to a herb-rich few winter-wet swamps south and west from c. Ballarat, growing on volcanic clays or peat soils.(Walsh and Entwisle 1999).	U
Triglochin mucronata	Prickly Arrowgrass		en	2	1905	VBA	Rare, widespread but sporadic in Victoria, usually found in grassland and grassy woodland.(Walsh and Entwisle 1999).	U
Tripogonella loliiformis	Rye Beetle-grass		en	4	1998	VBA	Usually found in coastal and hinterland areas west from Bairnsdale, but extending well inland in the far-western part of the state. Grows primarily in mesic coastal heathlands, grasslands and woodlands, but is also found in drier inland heathlands, open forests and woodlands. Substrates may be moist or dry sandy loams (Backhouse & Jeanes 1995).	P
Xerochrysum palustre	Swamp Everlasting	VU	cr			PMST	Grows mostly in coastal heathland, grassland and woodland, but extending further inland into similar habitats in the western part of its range. Substrates may be moist or dry sandy soils. (Weber Entwisle 1994).	U

Appendix D

Rare or threatened fauna species identified within 10 km of the project area by the VBA and PMST

Key to Table

EPBC: Environment Protection and Biodiversity Conservation Act

– VU Vulnerable
– EN Endangered
– CR Critically Endangered

FFG: Flora and Fauna Guarantee Act

– vu Vulnerable
– en Endangered
– cr Critically Endangered

Source:

VBA – Victorian Biodiversity Atlas

PMST – Protected Matters Search Tool

Common name	Scientific Name	EPBC Act	FFG Act	Count	Last Recorded	Source
Mammals						
Platypus	*Ornithorhynchus anatinus*		vu	5	2019	VBA
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	EN	en			PMST
Swamp Antechinus	*Antechinus minimus maritimus*	VU	vu			PMST
Eastern Barred Bandicoot	*Perameles gunnii*	EN	en	36	1980	VBA
Grey-headed Flying-fox	*Pteropus poliocephalus*	VU	vu	12	2018	VBA, PMST
Birds						
Plains-wanderer	*Pedionomus torquatus*	CR	cr			PMST
Diamond Dove	*Geopelia cuneata*		vu	1	1977	VBA
Lewin's Rail	*Lewinia pectoralis*		vu	14	2014	VBA
White-faced Storm-Petrel	*Pelagodroma marina*		en	2	2016	VBA
Southern Giant-Petrel	*Macronectes giganteus*	EN	en			PMST
Northern Giant-Petrel	*Macronectes halli*	VU	en			PMST
Wandering Albatross	*Diomedea exulans*	VU	cr			PMST
Antipodean Albatross	*Diomedea antipodensis*	VU				PMST
Black-browed Albatross	*Thalassarche melanophris*	VU				PMST
Grey-headed Albatross	*Thalassarche chrysostoma*	EN	en			PMST
Shy Albatross	*Thalassarche cauta*	EN	en			PMST
White-capped Albatross	*Thalassarche cauta steadi*	VU				PMST
Salvin's Albatross	*Thalassarche salvini*	VU				PMST
Sooty Albatross	*Phoebetria fusca*	VU	cr			PMST
Southern Royal Albatross	*Diomedea epomophora*	VU	cr			PMST
Northern Royal Albatross	*Diomedea sanfordi*	EN				PMST
Campbell Albatross	*Thalassarche impavida*	VU				PMST
Buller's Albatross	*Thalassarche bulleri*	VU	en			PMST
Indian Yellow-nosed Albatross	*Thalassarche carteri*		en	1	1979	VBA
Caspian Tern	*Hydroprogne caspia*		vu	104	2019	VBA
Little Tern	*Sternula albifrons*		cr	109	2019	VBA, PMST
Fairy Tern	*Sternula nereis*	VU	cr	259	2019	VBA, PMST
Ruddy Turnstone	*Arenaria interpres*		en	46	2018	VBA, PMST

Common name	Scientific Name	EPBC Act	FFG Act	Count	Last Recorded	Source
Grey Plover	*Pluvialis squatarola*		vu	10	2017	VBA, PMST
Pacific Golden Plover	*Pluvialis fulva*		vu	65	2018	VBA, PMST
Hooded Plover	*Thinornis cucullatus*	VU	vu	2	2005	VBA, PMST
Lesser Sand Plover	*Charadrius mongolus*	EN	en	7	2008	VBA, PMST
Greater Sand Plover	*Charadrius leschenaultii*	VU	vu	2	1996	VBA
Eastern Curlew	*Numenius madagascariensis*	CR	cr	76	2013	VBA, PMST
Whimbrel	*Numenius phaeopus*		en	4	1990	VBA
Black-tailed Godwit	*Limosa limosa*		cr	10	2019	VBA, PMST
Bar-tailed Godwit	*Limosa lapponica*	VU	vu	21	2016	VBA, PMST
Wood Sandpiper	*Tringa glareola*		en	2	2016	VBA, PMST
Grey-tailed Tattler	*Tringa brevipes*		cr	37	2015	VBA, PMST
Common Sandpiper	*Actitis hypoleucos*		vu	20	2018	VBA, PMST
Common Greenshank	*Tringa nebularia*		en	591	2019	VBA, PMST
Marsh Sandpiper	*Tringa stagnatilis*		en	285	2019	VBA, PMST
Terek Sandpiper	*Xenus cinereus*		en	16	2017	VBA, PMST
Curlew Sandpiper	*Calidris ferruginea*	CR	cr	415	2019	VBA, PMST
Red Knot	*Calidris canutus*	EN	en	34	2018	VBA, PMST
Great Knot	*Calidris tenuirostris*	CR	cr	6	2010	VBA, PMST
Australian Painted-snipe	*Rostratula australis*	EN	cr	1	1956	VBA, PMST
Brolga	*Antigone rubicunda*		en	87	2020	VBA
Little Egret	*Egretta garzetta nigripes*		en	493	2019	VBA
Plumed Egret	*Ardea intermedia plumifera*		cr	21	2007	VBA
Eastern Great Egret	*Ardea alba modesta*		vu	1	2013	VBA
Australian Little Bittern	*Ixobrychus dubius*		en	1	1970	VBA
Australasian Bittern	*Botaurus poiciloptilus*	EN	cr	11	2002	VBA, PMST
Magpie Goose	*Anseranas semipalmata*		vu	934	2019	VBA
Australasian Shoveler	*Spatula rhynchotis*		vu	266	2019	VBA
Freckled Duck	*Stictonetta naevosa*		en	94	2019	VBA
Hardhead	*Aythya australis*		vu	735	2019	VBA
Blue-billed Duck	*Oxyura australis*		vu	107	2019	VBA
Musk Duck	*Biziura lobata*		vu	203	2019	VBA
Grey Goshawk	*Accipiter novaehollandiae*		en	49	2018	VBA
Little Eagle	*Hieraaetus morphnoides*		vu	341	2018	VBA
White-bellied Sea-Eagle	*Haliaeetus leucogaster*		en	45	2019	VBA
Square-tailed Kite	*Lophoictinia isura*		vu	1	2008	VBA
Grey Falcon	*Falco hypoleucos*	VU	vu			PMST
Black Falcon	*Falco subniger*		cr	71	2019	VBA
Barking Owl	*Ninox connivens*		cr	1	1969	VBA
Powerful Owl	*Ninox strenua*		vu	1	1969	VBA

Common name	Scientific Name	EPBC Act	FFG Act	Count	Last Recorded	Source
Masked Owl	*Tyto novaehollandiae*		cr	1	2018	VBA
Major Mitchell's Cockatoo	*Lophocroa leadbeateri*		cr	2	1999	VBA
Orange-bellied Parrot	*Neophema chrysogaster*	CR	cr	21	2019	VBA, PMST
Swift Parrot	*Lathamus discolor*	CR	cr	17	2019	VBA, PMST
White-throated Needletail	*Hirundapus caudacutus*	VU	vu	18	2016	VBA, PMST
Hooded Robin	*Melanodryas cucullata*		vu	3	2016	VBA
Speckled Warbler	*Pyrrholaemus sagittatus*		en	3	2018	VBA
Painted Honeyeater	*Grantiella picta*	VU	vu			PMST
Regent Honeyeater	*Anthochaera phrygia*	CR	cr	2	1993	VBA
Diamond Firetail	*Stagonopleura guttata*		vu	4	2013	VBA, PMST
Reptiles						
Striped Legless Lizard	*Delma impar*	VU	en	2	2020	VBA, PMST
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	EN	cr			PMST
Frog						
Growling Grass Frog	*Litoria raniformis*	VU	vu	8	2020	VBA, PMST
Invertebrates						
Yellow Sedge-skipper Butterfly	*Hesperilla flavescens*		en	4	1988	VBA
Golden Sun Moth	*Synemon plana*	CR	vu	1	2009	VBA, PMST
Otway Burrowing Crayfish	*Engaeus fultoni*		vu	1	1942	VBA
Sea-cucumber species	*Thyone nigra*		en	3	1960	VBA
Fish						
Australian Grayling	*Prototroctes maraena*	VU	en	39	1998	VBA, PMST
Dwarf Galaxias	*Galaxiella pusilla*	VU	en			PMST
Murray Cod	*Maccullochella peelii*	VU	en	1	1905	VBA
Macquarie Perch	*Macquaria australasica*	EN	en	6	1981	VBA
Yarra Pygmy Perch	*Nannoperca obscura*	VU	vu	3	2009	VBA, PMST

Appendix E

Migratory fauna identified by the VBA and PMST within 10 km of the project area

Key to Table

EPBC: Environment Protection and Biodiversity Conservation Act

– VU Vulnerable
– EN Endangered
– CR Critically Endangered

FFG: Flora and Fauna Guarantee Act

– vu Vulnerable
– en Endangered
– cr Critically Endangered

Common name	Scientific Name	EPBC Act	FFG Act
Common Sandpiper	*Actitis hypoleucos*		vu
Common Noddy	*Anous stolidus*		
Fork-tailed Swift	*Apus pacificus*		
Ruddy Turnstone	*Arenaria interpres*		en
Sharp-tailed Sandpiper	*Calidris acuminata*		
Curlew Sandpiper	*Calidris ferruginea*	CR	cr
Pectoral Sandpiper	*Calidris melanotos*		
Red-necked Stint	*Calidris ruficollis*		
Long-toed Stint	*Calidris subminuta*		
Great Knot	*Calidris tenuirostris*	CR	cr
Double-banded Plover	*Charadrius bicinctus*		
Lesser Sand Plover	*Charadrius mongolus*	EN	en
Antipodean Albatross	*Diomedea antipodensis*	VU	
Northern Royal Albatross	*Diomedea sanfordi*	EN	
Latham's Snipe	*Gallinago hardwickii*		
Pin-tailed Snipe	*Gallinago stenura*		
White-throated Needletail	*Hirundapus caudacutus*	VU	vu
Broad-billed Sandpiper	*Limicola falcinellus*		
Bar-tailed Godwit	*Limosa lapponica*	VU	vu
Black-tailed Godwit	*Limosa*		cr
Southern Giant-Petrel	*Macronectes giganteus*	EN	en
Northern Giant-petrel	*Macronectes halli*	VU	en
Satin Flycatcher	*Myiagra cyanoleuca*		
Eastern Curlew	*Numenius madagascariensis*	CR	cr
Osprey	*Pandion haliaetus*		
Red-necked Phalarope	*Phalaropus lobatus*		
Ruff	*Philomachus pugnax*		
Sooty Albatross	*Phoebetria fusca*	VU	cr
Pacific Golden Plover	*Pluvialis fulva*		vu
Grey Plover	*Pluvialis squatarola*		vu
Flesh-footed Shearwater	*Puffinus carneipes*		
Rufous Fantail	*Rhipidura rufifrons*		
Little Tern	*Sternula albifrons*		cr
Buller's Albatross	*Thalassarche bulleri*	VU	en
Shy Albatross	*Thalassarche cauta*	EN	en
Grey-headed Albatross	*Thalassarche chrysostoma*	EN	en
Campbell Albatross	*Thalassarche impavida*	VU	
Black-browed Albatross	*Thalassarche melanophris*	VU	

Common name	Scientific Name	EPBC Act	FFG Act
Salvin's Albatross	*Thalassarche salvini*	VU	
White-capped Albatross	*Thalassarche cauta steadi*	VU	
Grey-tailed Tattler	*Tringa brevipes*		cr
Wood Sandpiper	*Tringa glareola*		en
Common Greenshank	*Tringa nebularia*		en
Marsh Sandpiper	*Tringa stagnatilis*		en
Terek Sandpiper	*Xenus cinereus*		en