# City of Wanneroo

# Mather Drive
# Environmental Impact Assessment

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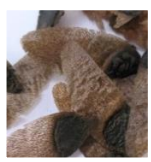

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# Executive Summary

Natural Area Consulting Management Services was commissioned by the City of Wanneroo to undertake an Environmental Impact Assessment at three sites on Mather Drive in the Neerabup Industrial Area, Neerabup. Findings from Natural Area's 2020 biological surveys as well as relevant desktop and literature reviews from past surveys of the area have been incorporated to assess the potential impacts arising from the development of these sites.

The three Mather Drive sites and corresponding proposed developments include:

- Mather Drive Road Reserve - new road proposed to service future subdivisions in Lot 9003
- Lot 41 - drainage expansion
- Lot 9100 - subdivision and industrial development.

Based on the outcomes of desktop research, literature reviews and Natural Area's spring biological surveys, the key environmental values for the three Mather Drive sites include:

- high flora biodiversity, with 167 species across 44 families recorded
- 29 vertebrate species recorded including three conservation significant species (Quenda, Carnaby's Cockatoo and Forest Red-tailed Cockatoo)
- over one hectare of good quality foraging habitat for black cockatoos within Lot 9100
- no known occurrence of threatened or priority ecological communities (TEC)
- no threatened or priority flora species observed
- no known wetlands of international or national importance
- no registered Aboriginal or European heritage sites.

Potential impacts that have been identified with the development of the three sites include:

- disturbance and damage to existing flora and vegetation
- loss of biodiversity and habitat
- impact to surrounding conservation areas (increased access, edge effects)
- introduction of non-native weed and fauna species
- altered fire regimes
- increased anthropogenic activities.

Management and mitigation measures should include:

- flora and vegetation management plan
- fauna management plan which includes a proposed fauna relocation/salvage program is recommended prior to land clearing as a mitigating measure to avoid unnecessary loss of biodiversity and minimize impacts of displaced fauna
- construction environmental management plan.

# Contents

# 1.0 Introduction

## 1.1 Background

The City of Wanneroo (the City) is proposing the development of three sites in the Neerabup Industrial Area (NIA) within the suburb of Neerabup. NIA is a general industrial estate located approximately 30km north of the Perth Central Business District. The three sites cover approximately 18 hectares and consist of:

- Mather Drive Road Reserve
- Lot 9100 Mather Drive
- Lot 41 Mather Drive.

The City received approval under the Environmental Protection and Biodiversity Conservation Act 1999 from the Department of Energy and Environment (EPBC 2007/3479). The approval, subject to conditional requirements, comprises native vegetation clearing (CPS 6359/3) and resource extraction followed by the gradual creation of industrial lots, construction of roads and drainage infrastructure, and installation of services within Lot 9100 and Lot 9003 Mather Drive. The City requires the clearing and expansion of the drainage reserve at Lot 41 and a proposed vehicle access road in Mather Road Reserve when the adjacent area (Lot 9003) is subdivided for industrial land development purposes. Subsequently, flora, vegetation and fauna surveys were conducted as part of clearing permit procedures for both Lot 41 and Mather Road Reserve sites.

A detailed and targeted flora and fauna assessment was undertaken of Lot 9100 in May 2013 but as this survey was conducted over 5 years ago, a new survey was required to reassess existing site conditions to inform all relevant stakeholders involved with the environmental planning procedures relating to the subdivision and industrial development of the site.

Findings from the 2020 biological surveys as well as relevant desktop and literature reviews have been incorporated as part of an Environmental Impact Assessment (EIA) to assess the potential impacts for the development for these sites.

## 1.2 Project Objectives and Scope of Works

Natural Area Consulting Management Services (Natural Area) was commissioned by the City to undertake an EIA of the three sites within NIA to determine the potential impacts of land clearing as well as subsequent impacts to the environment and surrounding areas post construction, when the sites commence operations.

A detailed flora and vegetation survey as well as a basic fauna survey was conducted by Natural Area in 2020 to record the flora and fauna assemblages present, and to identify any conservation significant biodiversity and/or threatened ecological communities that may occur within the three sites. Findings of the surveys, as well as literature reviews from previous studies were incorporated in the EIA report.

The EIA will assess the potential impacts of the proposed development against the following:

- Native vegetation clearing principles
- Key Diagnostic Criteria:
    - Banksia Woodlands of the Swan Coastal Plains

  - Tuart Woodland and forest of the Swan Coastal
- Significant impact criteria for Threatened Ecological Communities.

## 1.3 Legislation and Guidelines

### 1.3.1 Planning and Development Act 2005

An act to provide for a system of land use planning and development in the state to promote sustainable use and development of land. It includes specific controls over planning at the metropolitan level as well as review of local schemes and the subdivision of land.

### 1.3.2 Western Australian Biodiversity Conservation Act 2016

This act is meant to protect and conserve biodiversity as well as to promote the ecologically sustainable use of biodiversity components in the State. Any impacts on threatened species, critical habitats and ecological communities are regulated under this Act.

### 1.3.3 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

The EPBC Act serves to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. As such, any developer whose actions may have a significant impact on a matter of national environmental significance will have to take into consideration the protection of these crucial environmental and cultural values with the society's economic and social needs. This Act is administered by the Department of Agriculture, Water and the Environment.

### 1.3.4 Western Australian Environmental Protection Act 1986

This act provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing. This act is regulated and enforced by the Department of Water and Environmental Regulation.

### 1.3.5 Technical Guidance under the Environmental Protection Act 1986

Technical guidance serves to ensure that adequate data are obtained and used in environmental impact assessments. It provides advice on survey preparation, desktop study, type of survey required, sampling techniques as well as data analysis and reporting requirements. Both detailed flora and vegetation surveys as well as basic terrestrial vertebrate fauna surveys conducted by Natural Area were in accordance with Environmental Protection Authority's (EPA) technical guidance.

### 1.3.6 Environmental Protection (Clearing of Native Vegetation) Regulations 2004

Under these Regulations, it is an offence to clear native vegetation unless the clearing is done in accordance with a clearing permit, or if an exemption applies. Principles for clearing native vegetation under Schedule 5 of the *Environmental Protection Act 1986* includes the following:

Native vegetation should not be cleared if –

(a) it comprises a high level of biological diversity; or

(b) it comprises the whole or a part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia; or

(c) it includes, or is necessary for the continued existence of, rare flora; or

(d) it comprises the whole or a part of, or is necessary for the maintenance of a threatened ecological community; or
(e) it is significant as a remnant of native vegetation in an area that has been extensively cleared; or
(f) it is growing in, or in association with, an environment associated with a watercourse or wetland; or
(g) the clearing of the vegetation is likely to cause appreciable land degradation; or
(h) the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area; or
(i) the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water; or
(j) the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.

As such, if biodiversity values, land conservation and water protection roles of native vegetation are negatively impacted, clearing is generally not permitted.

# 2.0 Existing Environment

## 2.1 Location of Project Area

NIA is a general industrial estate within the suburb of Neerabup, located approximately 30 km north of the Perth Central Business District (Figure 1). NIA is bounded by Wattle Avenue and Barbagallo Raceway to the North, Lake Neerabup to the West, Flynn Drive to the South and Orchid Road/Pederick Road/Wanneroo Golf Course to the East.

The survey area includes three sites covering a total of approximately 18 hectares, including:

- Site 1: Mather Drive road reserve (1.17 ha)
- Site 2: Lot 9100 (60) Mather Drive (16.2702 ha)
- Site 3: Lot 41 (34) Mather Drive (0.5879 ha).

All three sites are located within the SWA 2 - Swan Coastal Plain subregion of the Swan Coastal Plain (Department of Primary Industries and Regional Development, 2020), which is described as low-lying coastal plains with alluvial river flats, coastal limestone and sands of colluvial and aeolian origin. The region is dominated by Banksia and/or Jarrah Woodland over sandy soils associated with the dune systems, with Paperbark (Melaleuca) in swampy/damp areas and Jarrah Woodland to the east where the Swan Coastal Plain rises (Mitchell, Williams & Desmond, 2002).

## 2.2 Landforms, Soils and Geology

Topography of the three sites ranges from 56 m to 80 m AHD, with lower elevations in the south rising to the north (Figure 2). Karrakatta Sand Yellow Phase is the only soil type present on both Lot 41 and Mather Road Reserve, while Lot 9100 contains both the Karrakatta Sand Yellow Phase and Karrakatta Sand Grey Phase present (Department of Primary Industries and Regional Development, 2020) (Table 1, Figure 2).

**Table 1**: Soil Types

| Name | Symbol | Description |
|---|---|---|
| Karrakatta Sand Yellow Phase | 211Sp_Ky | Low hilly to gently undulating terrain with yellow sand over limestone at 1-2 m. *Banksia spp.* woodland with scattered emergent *Eucalyptus gomphocephala* and *Eucalyptus marginata* and a dense shrub layer. |
| Karrakatta Sand Grey Phase | 211Sp_Kg | Low hilly to gently undulating terrain. Iron podzols. *Banksia spp*. woodland with *Eucalyptus todtiana* and depauperate *Eucalyptus marginata*; dense shrub layer. |

## 2.3 Surface Water and Wetlands

No wetlands or other water courses were identified within the study areas through a desktop search on the City of Wanneroo's online IntraMaps tool. The three sites are approximately 3 km east of Lake Neerabup and approximately 4.5 km north of Lake Joondalup and Mariginiup Lake. All three sites lie approximately 9 km east of the Indian Ocean.

## 2.4 Groundwater

All three sites sit above the Perth - Superficial Swan aquifer, with varying depths to the underground water table ranging from 22 m in Lot 41 to over 40 m in Mather Drive Road Reserve due to the undulating topography, according to the Perth Groundwater Map (Department of Water and Environmental Regulation, 2017).

## 2.5 Climate

The climate experienced in the area is Mediterranean, with dry, hot summers and cool, wet winters. According to the Bureau of Meteorology (Perth Airport, Station ID 009021, 2020):

- average rainfall is 762.1 mm pa, with the majority falling between May and August
- average maximum temperatures range from 18.0 $^{o}$C in winter to 32.0 $^{o}$C in summer, with the highest recorded maximum being 46.7 $^{o}$C
- average minimum temperatures range from 8.0 $^{o}$C in winter to 17.5 $^{o}$C in summer, with the lowest recorded minimum being -1.3 $^{o}$C
- predominant wind directions include morning easterlies and westerly sea breezes during summer months, with average windspeeds up to 22.7 km/h and gusts greater than 100km/h.

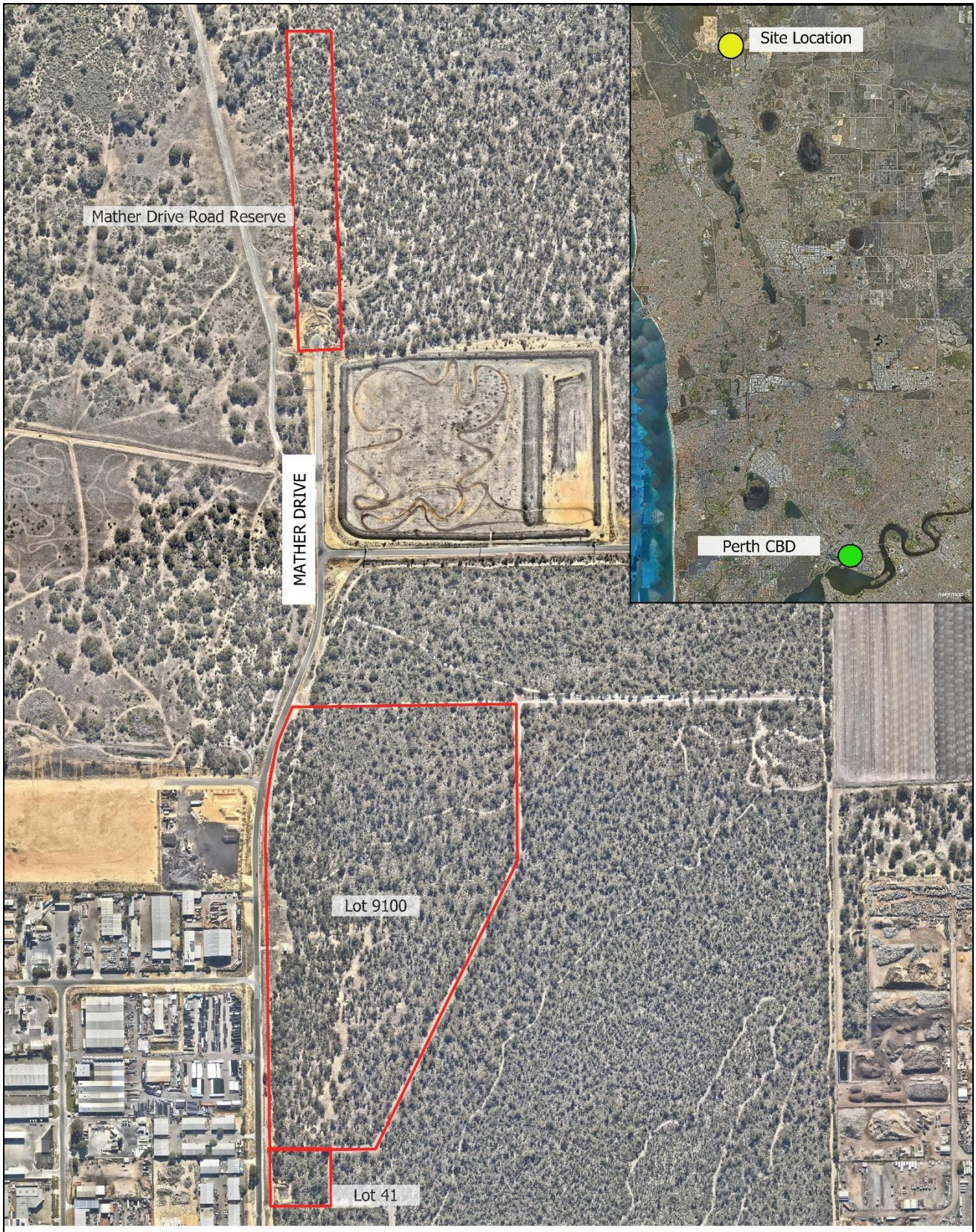


**Figure 1:**
Mather Drive Reserves
Neerabup, WA

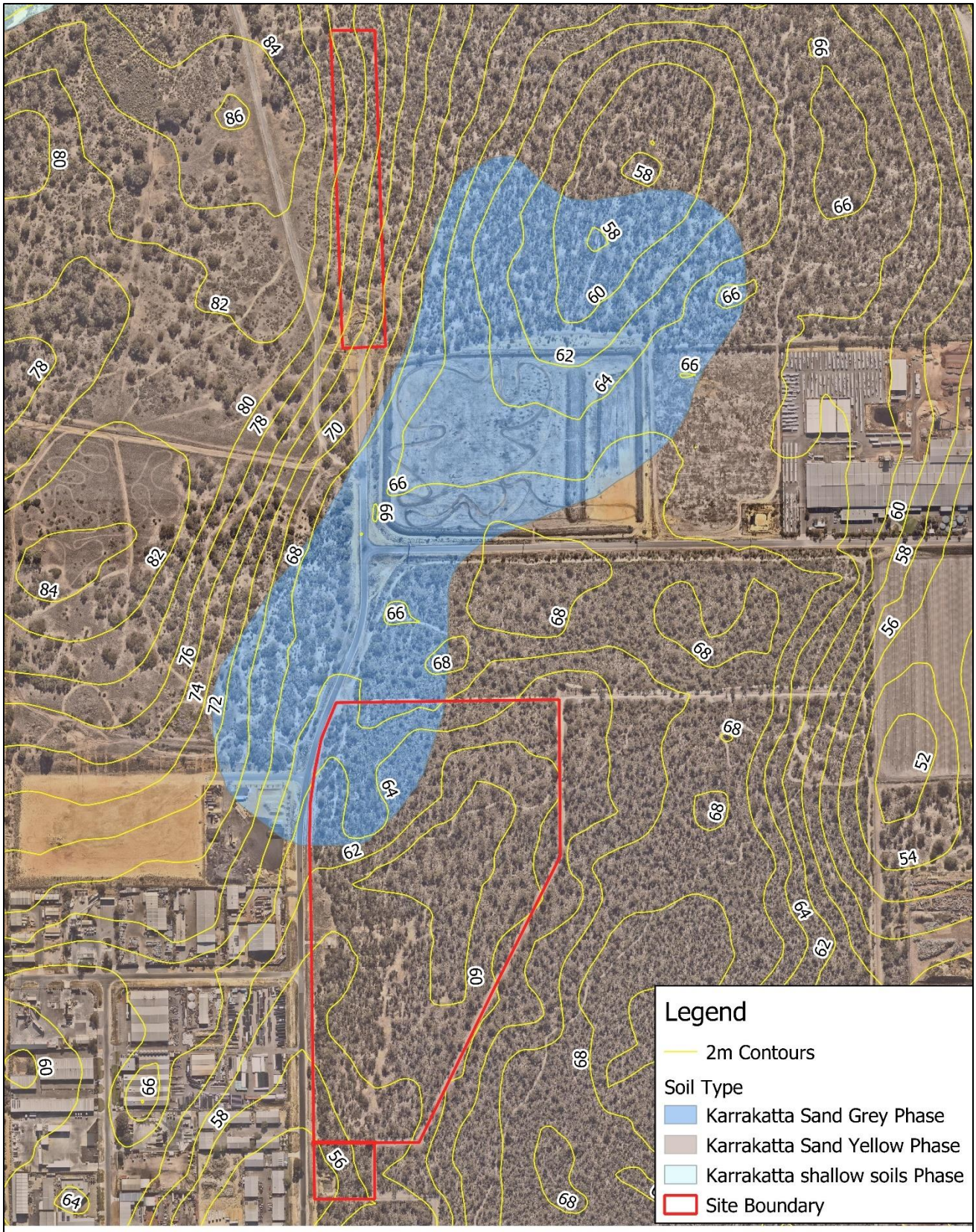


**Figure 2:**
Topography and Soils
Mather Drive Reserves
Neerabup, WA

## 2.6 Heritage - Aboriginal and European

A desktop search of the Aboriginal Heritage Inquiry system lists no known registered aboriginal sites within the study area. There are also no heritage sites listed on the State Register of Heritage Places (Department of Planning, Lands and Heritage, 2021).

The closest registered aboriginal sites are Orchestra Shell Cave (Site 4404) and Murray's Cave (Site 3315) which lies approximately 3.5 km north-west of the proposed site within Neerabup National Park, and Honey Possum site (Site 3503) which occurs in Boomerang Park around 2km southeast of Lot 41. In addition, there are several lime kilns listed under the City's Municipal Heritage Inventory which are located within Lake Neerabup, outside of the proposed development sites.

## 2.7 Land Use History

A review of aerial imagery from Nearmap (2021) shows no land use changes to the three sites since December 2007, with all sites remaining in a vegetated state. Road construction of Mather Drive occurred in 1985, with extension of the road and land clearing in the southern portion of Mather Drive Road Reserve occurring in 2003 (Landgate, 2021).

Lot 9100 and Lot 41 are currently zoned as Industrial Development, with Mather Drive Road Reserve zoned as Industrial under the District Planning Scheme Number 2 (City of Wanneroo, 2021).

## 2.8 Background and Contextual Information About Species and Communities at Risk

Species of flora will be assigned different conservation codes depending on their conservation status in relation to geographic restrictions and/or threats from local processes. The Western Australian State Minister for the Environment can declare taxa as Threatened (Declared Rare Flora) if they are considered to be in danger of extinction, rare or otherwise in need of special protection. The list of Threatened flora is reviewed by a panel annually and the scientific review assesses a taxon's conservation status and ranks them into their respective categories.

Any action that may potentially have a significant impact on a species listed under the EPBC Act also requires referral to the Commonwealth Department of the Environment. Tables 2 and 3 describe the various conservation codes at both State and Commonwealth level.

**Table 2:** Western Australian Conservation Codes

| Conservation Code | Name | Description |
|---|---|---|
| T | Threatened | Flora or fauna that is rare or likely to become extinct, ranked according to their level of threat using IUCN Red List criteria (Schedules 1-3 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice) |
| CR | Critically endangered | Species considered to be facing an extremely high risk of extinction within the wild in the immediate future |

| Conservation Code | Name | Description |
|---|---|---|
| EN | Endangered | Species considered to be facing a very high risk of extinction in the wild in the near future |
| VU | Vulnerable | Species considered to be facing a high risk of extinction in the wild in the medium-term future |
| EX | Extinct Species | Species where 'there is no reasonable doubt that the last member of the species has died<br>(Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice or the Wildlife Conservation (Rare Flora) Notice) |
| EW | Extinct in the Wild | Species that are known to only survive in cultivation, in captivity, or as a naturalised population well outside its past range; and it has not been recorded in its known or expected habitat at appropriate seasons anywhere in its past range, despite surveys over a timeframe appropriate to its life cycle and form |
| MI | Migratory Species | Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth<br>(Schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| CD | Conservation Dependent | Species of special conservation interest (conservation dependent fauna), being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened (Schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| OS | Specially Protected | Fauna otherwise in need of special protection to ensure their conservation<br>(Schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice) |
| P | Priority Species | Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora. Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. |
| P1 | Priority One | Poorly known species – Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either very small or on lands not managed for |

| Conservation Code | Name | Description |
|---|---|---|
| | | conservation, such as road verges, urban areas, farmland, active mineral lease and under threat of habitat destruction or degradation. |
| P2 | Priority Two | Poorly known species – Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, such as national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves and similar. |
| P3 | Priority Three | Poorly known species – Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat |
| P4 | Priority Four | Rare or near threatened and other species in need of monitoring. |

(Source: Department of Biodiversity, Conservation and Attractions, 2020a)

**Table 3:** Commonwealth Conservation Codes

| Category | Description |
|---|---|
| Critically Endangered | Species facing an extremely high risk of extinction in the wild in the immediate future |
| Endangered | Species facing a very high risk of extinction in the wild in the near future |
| Vulnerable | Species facing a high risk of extinction in the wild in the medium term |

(Source: Department of Agriculture Water and the Environment 2020)

The EPBC Act provides protection for Threatened Ecological Communities (TECs) under federal legislation, which are defined as communities which are:

- **Critically Endangered**
  An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or that was originally of limited distribution and is facing severe modification or destruction throughout its range in the immediate future or is already severely degraded throughout its range but capable of being substantially restored or rehabilitated. An ecological community will be listed as Critically Endangered when it has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future.
- **Endangered**
  An ecological community that has been adequately surveyed and found to have been subject to a major contraction in area and/or was originally of limited distribution and is in danger of significant modification throughout its range or severe modification or destruction over most of its range in the near future. An ecological community will be listed as Endangered when it has been adequately surveyed and is not Critically Endangered but is facing a very high risk of total destruction in the near future.

- **Vulnerable**
  An ecological community that has been adequately surveyed and is found to be declining and/or has declined in distribution and/or condition and whose ultimate security has not yet been assured and/or a community that is still widespread but is believed likely to move into a category of higher threat in the near future if threatening processes continue or begin operating throughout its range. An ecological community will be listed as Vulnerable when it has been adequately surveyed and is not Critically Endangered or Endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

A community may also be listed as a Priority Ecological Community (PEC) if it is under consideration for listing as a TEC but does not yet meet the criteria or has not been adequately defined.

## 2.9 Conservation Reserves

According to the City of Wanneroo District Planning Scheme No.2, the following 'Conservation' reserves in the immediate vicinity to the proposed Mather Road sites include:

- Flynn Park (1.8 ha)
- Mather Reserve (50 ha)
- Wallangara Reserve (7.1 ha)
- Wallangara Reserve (Proposed) (1.9 ha)
- Banksia Grove (Lot 8031) (40.9 ha).

Mather Reserve lies directly to the east of Lot 41 and Lot 9100. It consists of approximately 50 ha of native vegetation providing good quality foraging and potential habitat trees (Terratree, 2016. Ecoscape, 2020). Zoning of Mather Reserve was changed from industrial use to conservation tenure and is currently serving as an Offset Site, managed in accordance with a Conservation Area Management Plan (CAMP) - Mather Reserve (53163) and Lot 24 Mary Street, Wanneroo.

## 2.10 Bush Forever

Bush Forever is a strategic plan to protect regionally significant bushland within the Perth Metropolitan Region of the Swan Coastal Plain. Lot 41 and the southern portion of Lot 9100 are within Bush Forever site (295). According to Bush Forever Volume 2 (Government of WA, 2000), Site 295 is described as Low Woodland to Low Open Forest dominated by *Banksia attenuata* and *B. menziesii* with scattered to co-dominant *Eucalyptus todtiana, E. marginate, Nuytsia floribunda* and *Allocasuarina fraseriana.* Tall Closed Scrub to Tall Shrubland of *Adenanthos cygnorum.* Open to Closed Low Health consisting of *Hibbertia hypericoides, Daviesia triflora* and *Leucopogon conostephioides*. Most of the site (75%) consists of Excellent to Very Good vegetation condition, with areas of severe localised disturbance.

Clearing native vegetation within a Bush Forever site can only be undertaken if an approval has been granted under the EP Act or if the planning approval granted under the Planning and Development Act 2005, is subject to an exemption under the EP Act. An exemption is a type of clearing activity that does not require a clearing permit. These laws apply to private and public lands throughout Western Australia. Clearing exemptions do not apply to vegetation within Environmentally Sensitive Areas (ESAs), and as Lot 41 is located within an ESA it is not subject to clearing exemptions and will require a clearing permit or development approval.

The City received approval under the Environmental Protection and Biodiversity Conservation Act 1999 from the Department of Energy and Environment (EPBC 2007/3479). The approval, subject to conditional requirements, comprises native vegetation clearing (CPS 6359/3) and resource extraction followed by the gradual creation of industrial lots, construction of roads and drainage infrastructure, and installation of services within Lot 9100 and Lot 9003 Mather Drive.

# 3.0 Results of 2020 Flora, Vegetation and Fauna Surveys

A detailed flora and vegetation survey was carried out by Natural Area during spring 2020 and in accordance with *EPA Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment* (Environmental Protection Authority, 2016). The survey catalogues the various species, vegetation type and condition of the three Mather Drive sites.

A basic fauna survey was also completed in spring 2020, in accordance with *Environmental Protection Authority (EPA) Technical Guidance, Terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA, 2020). A basic survey is a low-intensity survey which gathers broad fauna and habitat information including opportunistic fauna observations.

## 3.1 Flora

All three survey sites consist of remnant Jarrah, Banksia and Allocasuarina Woodland with a high level of flora diversity. 167 flora species (taxa) were recorded across the three sites, of which 131 (78.5%) are natives and 36 (21.5%) introduced species. Lots 41 and 9100 are in a better vegetative condition with more intact remnant vegetation and this is represented by the higher plant diversity recorded on site with 92 and 123 species, respectively. 57 flora species were recorded in Mather Drive Road Reserve, which has a history of clearing and disturbance and is in a degraded condition. A complete flora list is provided in Appendix 4, with specific details on the flora and vegetation survey outlined in Natural Area's unpublished report for the City of Wanneroo, *Flora & Vegetation Assessment Mather Drive, Neerabup* (2020a).

### 3.1.1 Threatened and Priority Flora

No threatened or priority species, or regionally significant flora were recorded during the 2020 field survey.

### 3.1.2 Species of 'Other' Conservation Significance

NatureMap indicated five conservation significant flora species listed under the *Biodiversity Conservation Act 2016* (WA), potentially occurring within 3 km of the site (Department of Biodiversity Conservation and Attractions, 2020). The Protected Matters Search Tool (PMST) indicated nine threatened flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (*EPBC Act*) (Commonwealth) as potentially occurring within a 3 km radius of the site (Department of Agriculture, Water and the Environment, 2020).

A review of the DBCA threatened and priority flora database indicated 30 threatened or priority species that have been previously recorded within a 10 km buffer of the survey site (DBCA, 2020). Of those identified, 8 species (3 threatened and 5 priority) were identified in the NatureMap and PMST reports. The conservation code descriptions are provided in Tables 2 and 3.

Of the conservation significant species indicated to potentially be found in the area, Natural Area considers the habitat to be suitable for ten species based on the soil type, drainage and location. These are highlighted green in Table 4.

**Table 4:** Potential threatened and priority species indicated by online databases

| Species | Common Name | Cons. Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|---|
| *Acacia benthamii* | Bentham's wattle | P2 | | | X |
| *Austrostipa mundula* | | P3 | | | X |
| *Andersonia gracilis* | Slender Andersonia | T, EN | | X | |
| *Anigozanthos viridis subsp. terraspectans* | Dwarf Green Kangaroo Paw | T, VU | | X | |
| *Baeckea sp.* Limestone | | P1 | | | X |
| *Caladenia huegelii* | Grand Spider Orchid | T, EN | | X | X |
| *Calectasia elegans* | Elegant Tinsel Lily | P2 | | | X |
| *Conostylis bracteata* | | P3 | | | X |
| *Cyathochaeta teretifolia* | | P3 | | | X |
| *Diuris micrantha* | Dwarf Bee Orchid | T, VU | | X | |
| *Diuris purdiei* | Purdie's Donkey Orchid | T, EN | | X | |
| *Drakaea elastica* | Glossy-leaved Hammer Orchid | T, EN | | X | |
| *Drakaea micrantha* | Dwarf Hammer Orchid | T, VU | | X | |
| *Drosera patens* | | P1 | X | | X |
| *Drosera* x *sidjamesii* | | P1 | X | | X |
| *Eucalyptus argutifolia* | Wabling Hill Mallee | T, VU | | X | X |
| *Fabronia hampeana* | | P2 | | | X |
| *Grevillea sp.* Ocean Reef | | P1 | | | X |
| *Hibbertia leptotheca* | | P3 | | | X |
| *Jacksonia gracillima* | | P3 | | | X |
| *Jacksonia sericea* | Waldjumi | P4 | X | | X |
| *Lecania turicensis var. turicensis* | | P2 | | | X |
| *Leucopogon sp. Yanchep* | | P3 | | | X |
| *Marianthus paralius* | | T | | | X |
| *Melaleuca sp. Wanneroo* | | T, EN | | X | X |
| *Pimelea calcicola* | | P3 | | | X |
| *Pithocarpa corymbulosa* | Corymbose Pithocarpa | P3 | | | X |
| *Poranthera moorokatta* | | P2 | X | | X |
| *Sarcozona bicarinata* | | P3 | | | X |
| *Stenanthemum sublineare* | | P2 | | | X |

| Species | Common Name | Cons. Code | NatureMap | PMST | DBCA |
|---|---|---|---|---|---|
| *Stylidium longitubum* | Jumping Jacks | P4 | | | X |
| *Stylidium paludicola* | | P3 | | | X |
| *Stylidium maritimum* | | P3 | X | | |
| *Styphelia filifolia* | | P3 | | | X |
| *Tetraria sp. Chandala* | | P2 | | | X |
| *Thelymitra variegata* | Queen of Sheba | P2 | | | X |
| *Tripterococcus sp.* Brachylobus | | P4 | | | X |

### 3.1.3 Weeds

36 introduced flora species (Appendix 1) were recorded across the three sites. This represents 21.5% of the total flora species recorded during the field survey and the mainly constitute common bushland weed species around the Perth metropolitan region. No weeds of national significance listed by the Australian Government or declared pests listed under the *Biosecurity and Agriculture Management Act 2007* (WA) were recorded within any of the three sites. The most common weed species recorded were from the Asteraceae (daisies) and Poaceae (grasses) families. Examples of weed species recorded on site are shown in Figure 3.

*Hottentot Fig (*Carpobrotus edulis)* (Lot 9100) | *Cape Weed (Mather Dr RR) (*Arctotheca calendula)* | **Osteospermum ecklonis* (Lot 41)

**Figure 3:** Examples of introduced species recoded during the flora assessment

The Department of Biodiversity, Conservation and Attractions (2020) has developed a Weed Prioritisation Process for the Swan Region which is used as a tool to determine weed management priorities on DBCA land and is a useful guide for others. Species are given an ecological impact rating of unknown (U), low (L), medium (M) or high (H). The weed species found in the three sites and their ecological impact ratings are listed in Table 5; weeds listed as high or medium should be the focus of future weed control planning for the site.

**Table 5:** Swan Region Ecological Impact Rating for Weeds at three Mather Road sites

| Species | Common Name | Ecological Impact | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|---|
| **Acacia iteaphylla* | Flinders Range Wattle | H | | | X |
| **Aira cupaniana* | | U | | | X |
| **Arctotheca calendula* | Cape Weed | H | X | X | X |
| **Avena barbata* | Bearded Oat | H | X | | |
| **Brassica tournefortii* | Mediterranean Turnip | H | | X | X |
| **Briza maxima* | Blowfly Grass | U | X | X | X |
| *Carpobrotus edulis | Hottentot Fig | H | X | X | X |
| **Crassula glomerata* | | U | | | X |
| **Ehrharta calycina* | Perennial Veldt Grass | H | X | X | X |
| *Eragrostis curvula | African Lovegrass | H | | X | |
| *Erodium botrys | Long Storksbill | U | | X | X |
| **Euphorbia terracina* | Geraldton Carnation Weed | H | X | X | |
| **Gladiolus caryophyllaceus* | Wild Gladiolus | H | X | X | X |
| **Hypochaeris glabra* | Smooth Cats-ear | H | X | X | X |
| **Lavandula sp.* | Lavender | U | | X | |
| *Leontodon rhagadioloides | Cretan Weed | L | | X | |
| **Lolium rigidulum* | Wimmera Ryegrass | H | | | X |
| **Lotus subbiflorus* | | H | | | X |
| **Lupinus cosentinii* | Blue Lupin | H | | X | |
| **Lysimachia arvensis* | Pimpernel | U | | | X |
| **Monoculus monstrosus* | Stinking Roger | M | | | X |
| **Oenothera drummondii* | Beach evening Primrose | U | | X | |
| **Ornithopus compressus* | Yellow Serradella | M | | | X |
| **Osteospermum ecklonis* | Veldt Daisy | U | X | | |
| **Oxalis purpurea* | Largeflower Wood Sorrell | H | | | X |
| **Pelargonium capitatum* | Rose Pelargonium | H | | X | X |
| **Phytolacca octandra* | Red Ink Plant | U | | | X |
| **Ricinus communis* | Castor Oil | M | | X | |
| **Sonchus oleraceus* | Common Sowthistle | U | X | | X |
| **Trachyandra divaricata* | Onion weed | M | | X | |

| Species | Common Name | Ecological Impact | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|---|
| **Trifolium arvense* | Hare's-foot Clover | U | | | X |
| **Trifolium campestre* | Hop Clover | U | | X | X |
| **Urospermum picroides* | False Hawkbit | M | | | X |
| **Ursinia anthemoides* | Ursinia | U | X | X | X |
| **Vulpia myuros* | Rat's Tail Fescue | H | | | X |
| **Wahlenbergia capensis* | Cape Bluebell | U | | | X |

## 3.2 Vegetation

### 3.2.1 Context

In accordance with the Interim Biogeographic Regionalisation for Australia (IBRA), all three sites are located within the Swan Coastal Plain 2 (SWA2) subregion (Department of Primary Industries and Regional Development, 2020). The IBRA system characterizes regions based on climate, geology, landforms, types of vegetation and fauna present.

The SWA 2- Swan Coastal Plain subregion of the Swan Coastal Plain is described as low-lying coastal plains with alluvial river flats, coastal limestone and sands of colluvial and aeolian origin. The region is dominated by Banksia and/or Jarrah Woodland over sandy soils associated with the dune systems, with Paperbark (Melaleuca) in swampy/damp areas and Jarrah Woodland to the east where the Swan Coastal Plain rises (Mitchell, Williams & Desmond, 2002).

### 3.2.2 Vegetation Associations

One vegetation complex occurs across all three of the survey sites, Cottesloe Complex – Central and South, as indicated by the Environmental Planning Tool (Western Australian Local Government Association, 2020). The Cottesloe Complex – Central and South consists of a range of heath vegetation on limestone outcrops, and Tuart woodlands and open Tuart-Jarrah-Marri forest with Tuart distinctively dominant in deeper sands (Heddle, Loneragan & Havel, 1980).

The pre-European extent of this vegetation complex remaining is 15,815.73 ha (35.22%) for the Swan Coastal Plain (Western Australian Local Government Association (WALGA), 2013). The Pre-European extent remaining for this complex within the City of Wanneroo local government area is 6,122.77 ha (46%) (WALGA, 2010).

### 3.2.3 Vegetation Types and Condition

One vegetation type was recorded within the three survey sites on Mather Drive, namely *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland. This consisted of *Eucalyptus marginata*, *Banksia attenuata* and *Allocasuarina fraseriana* Woodland over *Hibbertia hypericoides*, *Xanthorrhoea preissii* and mixed shrubland and an understorey of *Mesomelaena pseudostygia* and mixed native herbs and sedges and weedy grasses in more disturbed areas. This vegetation type relates to SCP 28

*Banksia attenuata* or *Banksia attenuata – Eucalyptus* Woodland. This vegetation community was consistent with what was recorded by Eco Logical in 2012 and confirmed in surveys undertaken by Ecoscape in 2019.

Vegetation condition ranged from Completely Degraded to Very Good across the three Mather Drive survey sites. The majority of the Mather Drive Road Reserve was in Completely Degraded condition due to previous disturbances and clearing from prior land uses, with small remnant patches of Good vegetation. There were also signs of unauthorised access and rubbish dumping which has contributed to the decreased vegetation condition of this area, whilst lesser rubbish dumping was noted in Lots 9100 and 41. Lot 9100 was mostly in Excellent condition, with lower condition areas occurring on the periphery of the vegetated site and where clearing occurred in 2019 - 2020 to salvage Grass Trees within the centre of the Lot. The vegetated areas of Lot 41 were mostly in Excellent condition, with cleared areas around the periphery and areas within the drainage sump classed as completely degraded and containing mostly weed species.

Vegetation condition in Lot 9000 to the east of Lot 9100 and Lot 41 was mostly in excellent condition and is consistent with what was present within these two Lots. The area adjacent Mather Drive Road Reserve had variable vegetation condition, with areas to the west similarly degraded due to previous clearing and disturbance. The areas east of this site were in better condition, ranging from Good to Excellent, with more intact vegetation present.

**Table 6:** Vegetation condition Mather Drive Road Reserve

| Vegetation Condition | Excellent | Very Good | Good | Degraded | Completely Degraded | Totals |
|---|---|---|---|---|---|---|
| **Area (ha)** | 0 | 0 | 0.3 | 1.8 | 0.5 | 2.6 |
| **Area (%)** | 0 | 0 | 11.6 | 69.2 | 19.2 | 100 |

**Table 7:** Vegetation condition Lot 9100 Mather Drive

| Vegetation Condition | Excellent | Very Good | Good | Degraded | Completely Degraded | Totals |
|---|---|---|---|---|---|---|
| **Area (ha)** | 8.8 | 5.2 | 0.3 | 0 | 2.3 | 16.6 |
| **Area (%)** | 53 | 31.3 | 1.8 | 0 | 13.9 | 100 |

**Table 8:** Vegetation condition Lot 41 Mather Drive

| Vegetation Condition | Excellent | Very Good | Good | Degraded | Completely Degraded | Totals |
|---|---|---|---|---|---|---|
| **Area (ha)** | 0.5 | 0 | 0 | 0 | 0.2 | 0.7 |
| **Area (%)** | 71.4 | 0 | 0 | 0 | 28.6 | 100 |

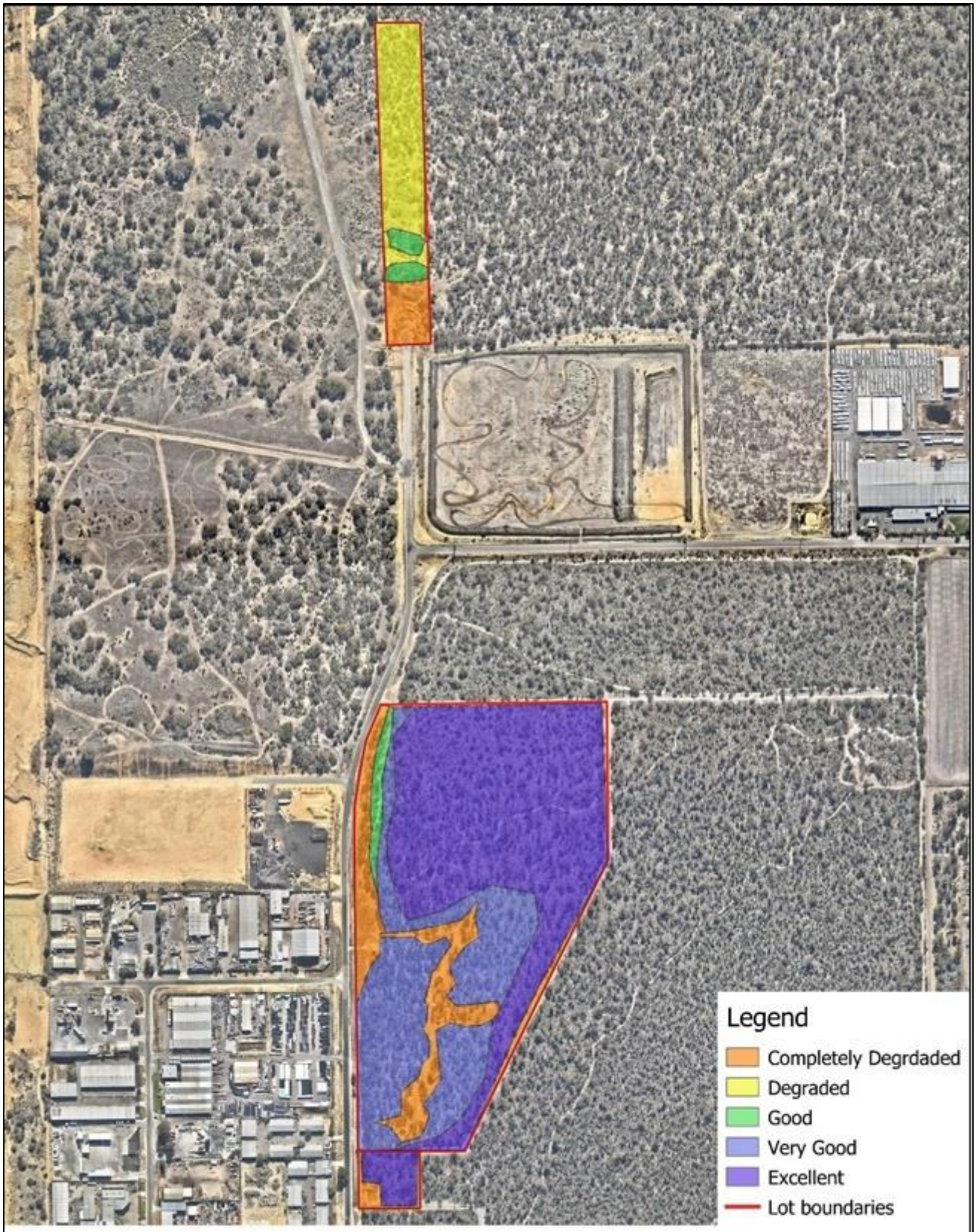


**Figure 3:**
Vegetation Condition
Mather Drive Reserves
Neerabup, WA

### 3.2.4 Threatened and Priority Ecological Communities

Two potentially occurring Threatened Ecological Communities (TEC) were identified within the Mather Drive sites using the PMST (Department of Agriculture, Water and the Environment, 2020), namely:

- *Banksia* Woodlands of the Swan Coastal Plain
- Tuart (*Eucalyptus gomphocephala)* Woodlands and Forests of the Swan Coastal Plain (PMST) (Department of Agriculture, Water and the Environment, 2020).

**Table 5:** Potential Threatened Ecological Communities indicated by online databases

| Name | Status | Type of presence |
|---|---|---|
| Banksia Woodlands of the Swan Coastal Plain | Endangered | Community likely to occur within the area |
| Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain | Critically Endangered | Community likely to occur within the area |

#### 3.2.4.1 Banksia Woodlands of the Swan Coastal Plain

No Banksia Woodlands of the Swan Coastal Plain threatened communities under the Envir*onment Protection and Biodiversity Conservation Act 1999* (Cwlth) were determined to occur within any of the three Mather Drive survey sites. Using key diagnostic characteristics set out by the Department of Environment and Energy (DoEE) (2019), Floristic Community Types (FCT) were identified over the three Mather Drive sites (Table 7). Mather Drive Road Reserve does not meet the condition and patch size to be classified as a TEC. Lot 41 and 9100 meet many of the key diagnostic characteristic of the Banksia TEC (Table 7), but they were not classified as a TEC based on statistical analysis against Gibson *et. al.* data (1994).

A comparison of the three sites flora quadrats to the Gibson *et al*. (1994) data found the highest similarity of 30 - 39.1% with quadrat KING2, which refers to floristic community type SCP 28 *Banksia attenuata* or *Banksia attenuata – Eucalyptus* Woodland. This species is a subgroup of the Banksia Woodlands of the Swan Coastal Plain but does not have its own conservation ratings for Western Australia or the Commonwealth and is not considered a TEC or PEC.

The closest threatened ecological community Banksia Woodlands of the Swan Coastal Plain – SCP 21a Central *Banksia attenuata – Eucalyptus marginata* Woodlands only sharing 10.6% - 25.3% similarity to the vegetation community assessed on site, which is a low similarity and not considered statistically significant.

The TEC FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands was recorded in Lot 9000 approximately 110 m south-east of Lot 9100 survey site by Eco Logical in 2012 (Figure 4). While Lot 9100 and Lot 4 does not constitute as part of the TEC identified by Eco Logical, they both occur within a 200 m buffer/ transitional zone outside of the TEC (DBCA, 2020b). The ecological community SCP 28 *Banksia attenuata* or *Banksia attenuata – Eucalyptus* Woodland was assigned to all three of the survey sites and this community does not have a conservation status listed for the State or Commonwealth.

**Table 7:** Key diagnostic characteristics for Banksia Woodland on the Swan Coastal Plain Threatened Ecological Community

| Key diagnostic characteristics | Description |
|---|---|
| Location and Physical Environment | Occurs primarily in the Swan Coastal Plain IBRA Bioregion with pockets extending into the adjacent lower parts of the Darling and Whicher escarpments, within the Jarrah Forest IBRA bioregion. |
| Soils and Landform | Typically occurs on well drained, low nutrient soils on sandplain landforms particularly,<br>Bassendean and Spearwood sands (occasionally Quindalup sands).<br>Common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dangaragan Plateau. |
| Structure | A low woodland forest with specific features including:<br>▪ a distinctive upper sclerophyllous layer of low trees, typically dominated or co-dominated by one or more Banksia species<br>▪ emergent trees of medium or tall (>10 m) height *Eucalyptus* or *Allocasuarina* species may be above the *Banksia* canopy<br>▪ a highly species-rich understory of various heights<br>▪ a herbaceous ground layer of cord rushes, sedges and perennial and ephemeral forbs, that sometimes includes grasses (ground layer may vary depending on the density of the shrub layer and disturbance history). |
| Composition | Canopy mostly dominated or co-dominated by *Banksia attenuata* and/or *Banksia menziesii.* Other *Banksia* species that can dominate are *B.prionotes* and *B. ilicifolia.* The patch must include at least one of the following diagnostic species:<br>▪ *Banksia attenuata* (candlestick banksia)<br>▪ *Banksia menziesii* (firewood banksia)<br>▪ *Banksia prionotes* (acorn banksia)<br>▪ *Banksia ilicifolia* (holly-leaved banksia).<br><br>If present, the emergent tree layer often includes *Corymbia calophylla, E. marginata*, or less commonly *E. gomphocephala.*<br><br>Other trees of a medium height that may be present, and may be codominant with the *Banksia* species across a patch, include:<br>▪ *Eucalyptus todtiana* (blackbutt)<br>▪ *Nuytsia floribunda* (Western Australian Christmas tree)<br>▪ *Allocasuarina fraseriana* (western sheoak)<br>▪ *Callitris arenaria* (sandplain cypress)<br>▪ *Callitris pyramidalis* (swamp cypress)<br>▪ *Xylomelum occidentale* (woody pear).<br><br>The understorey typically contains a high to very high diversity of shrub and herb species that often vary from patch to patch. |

| Key diagnostic characteristics | Description |
|---|---|
| Contra-indicators | Patches clearly dominated by *Banksia littoralis* or *Banksia burdetii* are not part of the Banksia Woodlands ecological community.<br><br>Floristic Community Type (FCT) 20c – Eastern shrublands and woodlands, corresponds with a separate EPBC ecological community listing, Shrublands and Woodlands of the eastern Swan Coastal Plain |
| Conditions | For a patch to be considered an area must meet 'Good' or higher condition, a minimum patch sizes for each condition is:<br>▪ 'Pristine' – no minimum patch size required<br>▪ 'Excellent' – 0.5 ha<br>▪ 'Very Good' - 1 ha<br>▪ 'Good' – 2 ha. |

Source: (DoEE, 2016)

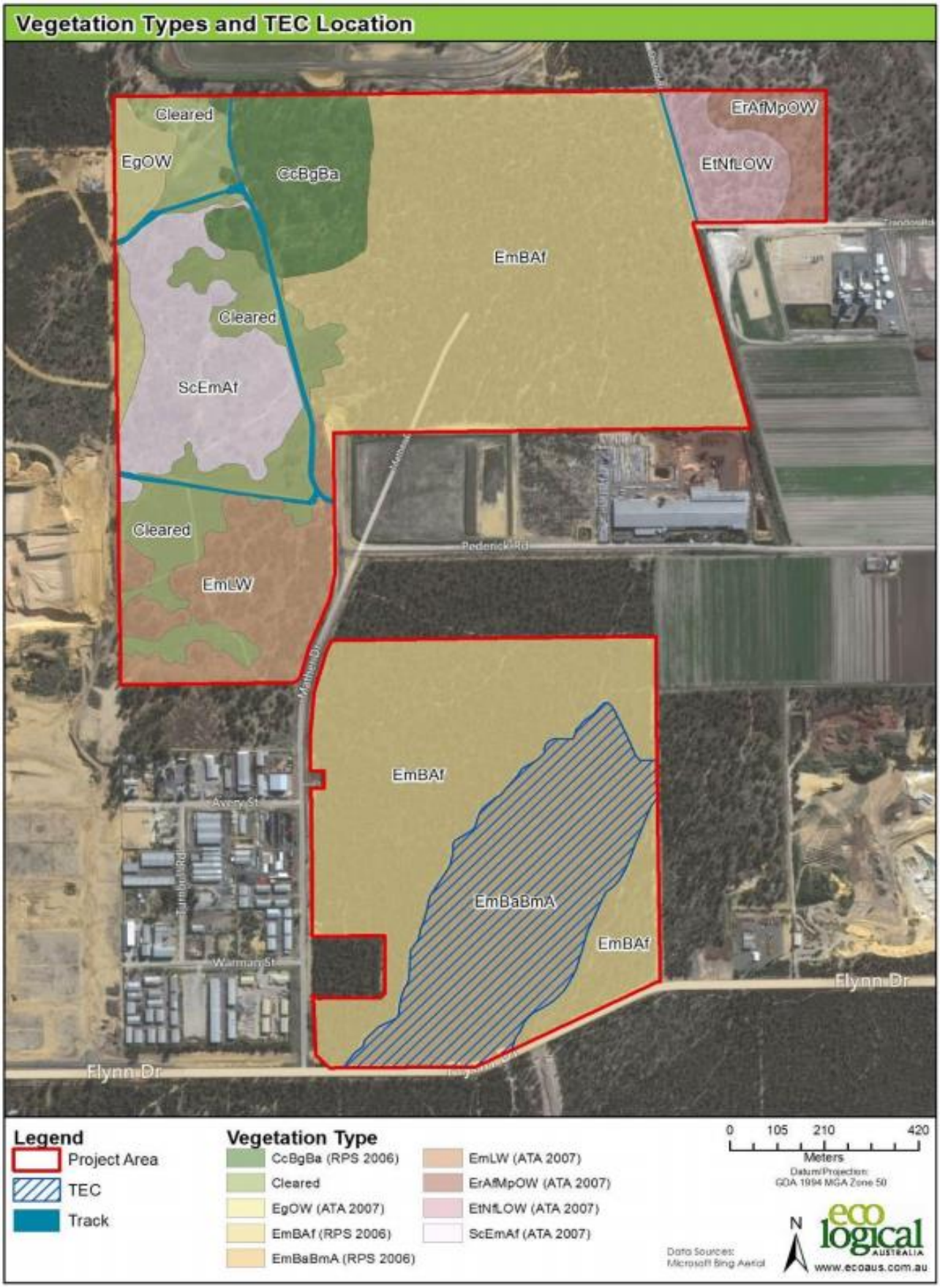


**Figure 4**: TEC recorded east of survey sites (source: Eco Logical Australia, 2012)

#### 3.2.4.2 Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain

No Tuart (*Eucalyptus gomphocephala)* woodlands of the Swan Coastal Plain communities under the Envir*onment Protection and Biodiversity Conservation Act 1999* (Cwlth) were determined to occur within any of the three Mather Road survey sites. One of the key diagnostic characteristics of this Threatened Ecological Community is the presence of Tuart *(Eucalyptus gomphocephala)*. Flora surveys of Mather Drive sites did not identify this species (Department of Environment and Energy (DoEE) (2019), Table 8.

**Table 8:** Key diagnostics characteristics of the Tuart woodlands and forests of the Swan Coastal Plain

| Key diagnostic characteristics | Description |
|---|---|
| Location | Occurs primarily in the Swan Coastal Plain IBRA Bioregion on Spearwood and Quindalup dune systems.<br>Can also occur on Bassendean dunes system, Pinjarra Plain system; and on the banks of rivers and wetlands |
| Structural Form | The presence of at least two living established *Eucalyptus gomphocephala* (Tuart) in the uppermost canopy.<br>Established tree is defined as ≥15 cm diameter breast height (DBH).<br>A Patch is defined as having a gap of no more than 60 m between outer edges of the canopies of adjacent Tuart trees. |
| Vegetation | Other tree species may be present in the canopy or sub-canopy. They commonly include:<br>▪ *Agonis flexuosa* (Peppermint)<br>▪ *Banksia grandis* (Bull Banksia)<br>▪ *Banksia attenuata* (Candlestick Banksia)<br>▪ *Eucalyptus marginata* (Jarrah)<br>▪ and less commonly<br>▪ *Corymbia calophylla* (Marri)<br>▪ *Banksia menziesii* (Firewood Banksia)<br>▪ *Banksia prionotes* (Acorn Banksia).<br>An understorey of native plants is typically present, which may include grasses, herbs and shrubs, although this is often modified by disturbance. |

Source: (DoEE, 2019).

## 3.3 Vertebrate Fauna

A total of 29 vertebrate species were recorded, with 23 occurring in Mather Drive Road Reserve, 16 in Lot 9100 and 16 in Lot 41. Of the vertebrate species, 20 birds, four reptiles and four mammal species were recorded. Table 9 illustrates the various fauna species recorded in their respective sites with conservation significant species highlighted in green. Specific details on the fauna survey are outlined in Natural Area's report to the City of Wanneroo, *Fauna Assessment Mather Drive, Neerabup WA* (Natural Area Consulting Management Service 2020b).

**Table 9**: Fauna species recorded on the three sites (*denotes introduced species)

| Group | Mather Dr Rd Res | Lot 9100 | Lot 41 | Family | Species | Common Name |
|---|---|---|---|---|---|---|
| **Birds** | | | | | | |
| | x | | | Alcedinidae | **Dacelo novaeguineae* | Laughing Kookaburra |
| | | | x | Columbidae | **Spilopelia senegalensis* | Laughing Turtle Dove |
| | x | | | Acanthizidae | *Acanthiza chrysorrhoa* | Yellow-rumped thornbill |
| | x | | | Cacatuidae | *Cacatua sanguinea* | Little Corella |
| | | | x | Cacatuidae | *Cacatuidae roseicapilla* | Galah, Pink and Grey |
| | x | x | x | Cacatuidae | *Calyptorhynchus banksii naso* | Forest Red-tailed Black Cockatoo (observed/signs of feeding) |
| | x | x | | Cacatuidae | *Calyptorhynchus latirostris* | Carnaby's Cockatoo (heard calls/seen flying over) |
| | | x | | Corvidae | *Corvus coronoides* | Australian Raven |
| | x | | x | Cracticidae | *Cracticus tibicen* | Australian Magpie |
| | | | x | Accipitridae | *Elanus caeruleus* | Black Shouldered Kite |
| | | | x | Hirundinidae | *Hirundo neoxena* | Welcome Swallow |
| | x | | x | Meliphagidae | *Lichmera indistincta* | Brown Honeyeater |
| | x | | | Maluridae | *Malurus splendens* | Splendid Fairywren |
| | | x | x | Meropidae | *Merops ornatus* | Rainbow Bee-eater |
| | | | x | Pachycephalidae | *Pachycephala rufiventris* | Rufous whistler |
| | x | | | Columbidae | *Phaps chalcoptera* | Common Bronzewing |
| | | x | | Meliphagidae | *Phylidonyris niger* | White-Cheeked Honeyeater |
| | | x | | Psittacidae | *Platycercus spurius* | Red-capped Parrot |

| Group | Mather Dr Rd Res | Lot 9100 | Lot 41 | Family | Species | Common Name |
|---|---|---|---|---|---|---|
| | | x | x | Psittacidae | *Platycercus zonarius* | Australian Ringneck |
| | x | | | Rhipiduridae | *Rhipidura albiscapa* | Grey Fantail |
| | x | | | Turnicidae | *Turnix varius varius* | Painted Buttonquail |
| **Invertebrate** | | | | | | |
| | x | x | | Apidae | **Apis mellifera* | European Honey Bee |
| | x | x | | Julidae | **Ommatoiulus moreletii* | Portuguese Millipede |
| | | x | | Ixodoidae | *Amblyomma triguttatum* | Kangaroo tick |
| | x | x | | Apidae | *Amegilla sp.* | Blue Banded Bee |
| | | x | | Sparassidae | *Delena sp.* | Huntsman Spider |
| | x | | | Formicidae | *Iridomyrmex purpureus* | Meat ant |
| | | x | | Formicidae | *Myrmecia pilosula* | Jack jumper ant |
| | x | | | Pieridae | *Pieris rapae* | Cabbage Butterfly |
| | | | x | Acrididae | | Cricket |
| | | | x | Syrphidae | | Hoverfly |
| | | | x | Tabanidae | | March fly |
| **Mammals** | | | | | | |
| | x | | x | Peramelidae | *Isoodon fusciventer* | Quenda, Bandicoot |
| | x | x | x | Macropodidae | *Macropus fuliginosus* | Western Grey Kangaroo (tracks, scats, bones) |
| | x | x | | Tachyglossidae | *Tachyglossus aculeatus acanthion* | Short-beaked Echidna |
| | x | | | Canidae | **Vulpes vulpes* | Red Fox |
| **Reptiles** | | | | | | |
| | | | x | Scincidae | *Cryptoblepharus buchananii* | Snake Eyed Skink |

| Group | Mather Dr Rd Res | Lot 9100 | Lot 41 | Family | Species | Common Name |
|---|---|---|---|---|---|---|
| | x | | | Agamidae | *Ctenophorus adelaidensis* | Western Heath Dragon |
| | x | x | | Scincidae | *Tiliqua rugosa rugosa* | Bobtail |
| | x | | | Varanidae | *Varanus sp.* | Goanna |

### 3.3.1 Fauna Habitat

Fauna habitat within Lot 9100 and Lot 41 is in good condition, with vegetation and fauna habitat relatively intact and no major signs of disturbance evident throughout these sites. These two lots contain good quality understorey for small mammals, reptiles and invertebrates and good quality foraging and nesting canopy for native bird species. Lots 9100 and 41 also contained good microhabitats for invertebrates including the conservation significant species listed in Table 9, with their preferred habitat species, and the presence of logs and leaf litter for retiles and invertebrates. The fauna habitat for Mather Drive Road reserve is in a more degraded state, mainly attributed to previous clearing and a lack of overstorey species for nesting birds. The habitat present does however provide a good foraging area for fauna inhabiting the higher quality bushland surrounding the site, with many species captured feeding in this area on trail cameras, including conservation significant species.

The food source for threatened black cockatoos is present within all three sites, with habitat trees previously recorded in Lot 9100 and Lot 41 by Ecoscape in 2020. Foraging habitat for the Priority 4 Quenda is also present in all three sites, with Lot 41 and Lot 9100 having denser understorey vegetation suitable for runnels (vegetative burrows). The Rainbow Bee-eater was observed in both Lot 9100 and 41; this species was previously listed as a threatened migratory species but has recently been de-listed. Rainbow Bee-eaters nest in burrows on the ground in open areas of sand; this habitat is present across all three sites.

### 3.3.2 Bioregional Vertebrate Fauna Assemblage

The Swan Coastal Plain comprises of highly valued habitats and remnant vegetation that includes woodlands, heath, wetlands, estuaries, river systems and coastal plain with high levels of diversity and endemism of flora and fauna.

Online databases indicated the potential for a total of 15 conservation significant fauna species (taxa) to occur within a 3 km radius of the survey site (Table 10). There were six conservation significant fauna species listed under the *Biodiversity Conservation Act 2016* (WA) identified as potentially occurring within a 3 km radius of the survey site by NatureMap (DBCA, 2020) (Appendix 1). A review of the Protected Matters Search tool (PMST) (Department of Agriculture, Water and the Environment 2020) indicated the potential for 10 fauna species, listed as protected under the *Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act)* to occur within a 3 km radius of the site (Appendix 2).

A review of the DBCA threatened and priority flora database indicated five threatened or priority species have been previously recorded within a 2 km radius of the survey site. These are highlighted green in Table 10 (Department of Biodiversity, Conservation and Attractions, 2020) (Table 2).

**Table 10**: Threatened and priority fauna species potentially occurring in the survey area

| Species Name | Common Name | Cons. Code | Nature Map | PMST | DBCA |
|---|---|---|---|---|---|
| **Birds** | | | | | |
| *Calidris canutus* | Red Knot, Knot | EN | | x | |
| *Calidris ferruginea* | Curlew Sandpiper | CR | | x | |
| *Calyptorhynchus banksii naso* | Forest Red-tailed Black Cockatoo | V | | x | |
| *Calyptorhynchus latirostris* | Carnaby's Cockatoo | EN, T | x | x | x |
| *Calyptorhynchus sp.* | White-tailed Black Cockatoo | T | x | | |
| *Leipoa ocellata* | Malleefowl | V | | x | |
| *Numenius madagascariensis* | Eastern Curlew | CR | | x | |
| *Rostratula australis* | Australian Painted Snipe | E | | x | |
| *Sternula neresis neresis* | Australian Fairy Turn | V | | x | |
| **Invertebrates** | | | | | |
| *Hesperocolletes douglasi* | Douglas' Broad-headed Bee, Rottnest Bee | CR | | x | |
| *Hylaeus globuliferus* | Wooly Bush Bee | P3 | x | | x |
| *Synemon gratiosa* | Graceful Sunmoth | P4 | x | | x |
| **Mammals** | | | | | |
| *Dasyurus geoffroii* | Chuditch, Western Quoll | V | | x | |
| *Isoodon fusciventer* | Quenda, Southwestern brown bandicoot | P4 | x | | x |
| *Notamacropus irma* | Western Brush Wallaby | P4 | x | | x |

### 3.3.3 Conservation Significant Vertebrate Fauna (Threatened and Priority Fauna)

Three conservation significant fauna species, namely Carnaby's Cockatoo *(Calyptorhynchus latirostris*), Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) and Quenda *(Isoodon fusciventer)* were recorded during the survey. Cockatoo habitat is present within the three Mather Drive sites in both good and poor condition. Evidence of foraging by cockatoos was identified in the form of chewed nuts and activity captured by trail cameras of Carnaby's foraging on grasses.

The presence of these conservation significant species within each of the three survey sites will need to be considered in future clearing permit applications, further environmental approvals, and any associated

impacts on the foraging flora species within the offsets. As Lot 9100 contains more than 1 ha of good quality foraging habitat for black cockatoos this triggers the referral guidelines in *EPBC Act Referral guidelines for three threatened black cockatoo species: Carnaby's cockatoo, Baudin's cockatoo and Forest red-tailed black cockatoo* (EPA, 2012).

Of the conservation significant species listed by DBCA as recorded previously within 2 km of the three sites, the P4 Graceful Sunmoth has the potential to occur due the presence of its preferred habitat species *Lomandra hermaphrodita*. However, this species is only present between February and April each year so would not have been present during the spring 2020 survey. The P3 Woolly Bush Bee also has a moderate probability of occurring within Lot 9100 due to the occurrence of its habitat species including *Adenanthos cygnorum* and *Banksia attenuata* present, however *Adenanthos cygnorum* is not present within the other two sites. The P4 Western Brush Wallaby is unlikely to occur within the sites as they usually prefer lower elevated areas near wetlands and were not recorded on trail cameras, whilst the Western Grey Kangaroo was prevalent throughout the site and may be another reason for the absence of wallabies, due to increased competition for resources in the area.

### 3.3.4 Introduced Fauna

A total of five introduced fauna species were recorded during the site survey, of which one was a mammal, two were invertebrates and two were birds. These introduced species are all common around the Perth Metropolitan Region. The Red Fox (*Vulpes vulpes*) is listed as a category C3 declared pest under the Bi*osecurity and Agriculture Management Act 2007* (WA) and requires control by landowners and/or managers to reduce the harmful impacts of the organism, reduce its number and contain the spread of the species.

# 4.0 Risk Assessment

## 4.1 Native Vegetation Clearing Principles as They Pertain to Flora, Vegetation and Vertebrate Fauna

An assessment against the ten Native Vegetation Clearing Principles was undertaken to determine the environmental significance of clearing vegetation within the three proposed sites. The assessment considers the likely environmental impacts and assists in determining the significance of the native vegetation in accordance with the requirements of the *Environmental Protection Act 1986.* Assessment of the three sites against these clearing principles found that Lot 9100 and Lot 41 may be at variance to four of the principles, whilst Mather Drive Road Reserve may be at variance to two (Table 11).

**Table 11:** Native vegetation clearing principles and assessment

| Clearing Principles | | Assessment |
|---|---|---|
| A | Native vegetation should not be cleared if it comprises a high level of biological diversity. | The proposed clearing in Lot 41 and Lot 9100 may be at variance with this principle:<br>▪ A high plant diversity was present across all three sites with a total of 167 flora species (131 native and 36 introduced weeds)<br>▪ Mather Drive Road Reserve:<br>– Good (11.6%)<br>– Degraded (69.2%)<br>– Completed Degraded (19.2%)<br>▪ Lot 9100 Mather Drive<br>– Excellent (53%)<br>– Very Good (31.3%)<br>– Good (1.8%)<br>– Completely Degraded (13.9%)<br>▪ Lot 41 Mather Drive<br>– Excellent (71.4%)<br>– Completely degraded (28.6%)<br>The proposed clearing of remanent vegetation in mostly Excellent vegetation condition, potentially resulting in the loss of high flora diversity may cause variance with Clearing Principle A for Lot 41 and Lot 9100.<br>The proposed clearing in Mather Road Reserve is not likely to be at variance with this principle due to majority of the site being Degraded. |
| B | Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a significant habitat for | The proposed clearing at all three sites may be at variance with this principle:<br>▪ Three conservation significant fauna species were recorded during the survey:<br>– Carnaby's Cockatoo *(Calyptorhynchus latirostris*)-Endangered/ Schedule 1<br>– Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)- Vulnerable<br>– Quenda *(Isoodon fusciventer)*-Priority 5 |

| Clearing Principles | | Assessment |
|---|---|---|
| | fauna indigenous to Western Australia | ▪ Cockatoo habitat is present within the three Mather Drive sites in both good and poor condition. Evidence of foraging by cockatoos was identified in the form of chewed nuts and activity captured by the trail cameras of Carnaby's foraging on grasses.<br>▪ Graceful Sunmoth (Priority 4) has the potential to occur due the presence of its preferred habitat species *Lomandra hermaphrodita*.<br>▪ Wooly Bush Bee (Priority 3) has a moderate possibility of occurring within Lot 9100 due to the occurrence of its habitat species including *Adenanthos cygnorum* and *Banksia attenuata* present, however *Adenanthos cygnorum* is not present in the other two sites. |
| C | Native vegetation should not be cleared if it includes, or is necessary for the continued existence of, rare flora. | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ No threatened or priority flora species were recorded within the three sites. |
| D | Native vegetation should not be cleared if it comprises the whole, or part of, or is necessary for the maintenance of, a threatened ecological community. | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ No threated or priority communities were recorded to be within any of the three sites.<br>▪ The TEC FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands was recorded in Lot 9000 approximately 110 m south-east of Lot 9100 survey site by Eco Logical in 2012. The ecological community SCP 28 *Banksia attenuata* or *Banksia attenuata – Eucalyptus* Woodland was assigned to all three of the survey sites and this community does not have a conservation status listed for the state or commonwealth. |
| E | Native vegetation should not be cleared if it is significant as a remnant of native vegetation in an area that has been extensively cleared. | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ Mather Reserve (approximately 50 ha) has been set aside as an Offset Site and managed by the City of Wanneroo under a Conservation Area Management Plan. Mather Reserve will continue its function to provide ecosystem services to surrounding areas. This includes providing high quality foraging habitat for black cockatoos. |
| F | Native vegetation should not be cleared if it is growing in or in association with a | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ All three sites are not growing in or in association with a watercourse or wetland. |

| Clearing Principles | | Assessment |
|---|---|---|
| | watercourse or wetland. | |
| G | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause appreciable land degradation. | The proposed clearing in Lot 41 and Lot 9100 may be at variance with this principle:<br>▪ Majority of Lot 41 and 9100 are in Excellent to Very Good vegetation condition with potential for erosion and land degradation to occur after removal of native vegetation.<br>The proposed clearing in Mather Road Reserve is not likely to be at variance with this principle due to majority of the site being Degraded. |
| H | Native vegetation should not be cleared if the clearing of the vegetation is likely to have an impact on the environmental values of any adjacent or nearby conservation area. | The proposed clearing at all three sites may be at variance with this principle:<br>▪ Adjacent Mather Reserve may be impacted by vegetation clearing with increased edge effects due to closer proximity to proposed industrial area. This area includes the TEC FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands. |
| I | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water. | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ No surface water courses were identified at any of the three sites. |
| J | Native vegetation should not be cleared if the clearing of the vegetation is likely to cause, or exacerbate, the intensity of flooding. | The proposed clearing is not likely to be at variance with this principle at any of the three sites:<br>▪ The soils within the three sites are sandy and porous with no wetlands, watercourses or areas subject to inundation.<br>▪ The clearing of native vegetation is not likely to increase the intensity of flooding. |

## 4.2 Matters of National Environmental Significance

Any action that could have a significant impact on any matter of National Environmental Significance (NES) will require a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). A referral is essentially an application for approval of an action that could have a significant impact on any matter of NES, including National Heritage values. The EPBC Act is regulated by the Department of Agriculture, Water and the Environment and it provides a legal framework to protect nationally and internationally important flora, fauna, ecological communities and heritage places.

Matters of national environmental significance include:

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

## 4.3 Referral Under the EPBC Act

Any implementation of a scheme or proposal that has the potential for significant environmental impacts must be referred to the Environmental Protection Authority (EPA) under Section 38 of the *Environmental Protection Act 1986* (EP Act).

This project has been referred to the EPA and approval was granted to clear the area of native vegetation, undertake resource extraction and industrial land development within the three Mather Road sites on 1 June 2014 (EPBC 2007/3479).

# 5.0 Potential Environmental Impacts

## 5.1 Flora and Vegetation terms and concepts

### 5.1.1 Flora

Flora is defined as any plant which is either native to Western Australia or declared to be flora under the *Wildlife Conservation Act 1950*. This includes, but is not limited to, wildflowers, palms, shrubs, trees, ferns, creepers, vines and any associated parts, seeds and spores thereof. Any activity involving the collection/taking of part or the whole plant may require a licence or permit. The various legislation pertaining to the conservation and protection of flora at both state and federal levels are illustrated in Tables 2 and 3.

No threatened or priority species, or regionally significant flora were recorded at any of the three Mather Drive sites.

### 5.1.2 Vegetation

All three sites are found within SWA 2- Swan Coastal Plain subregion of the Swan Coastal Plain (Department of Primary Industries and Regional Development, 2020) and is described as low-lying coastal plains with alluvial river flats, coastal limestone and sands of colluvial and aeolian origin. The region is dominated by Banksia and/or Jarrah Woodland over sandy soils associated with the dune systems, with Paperbark (Melaleuca) in swampy/damp areas and Jarrah Woodland to the east where the Swan Coastal Plain rises (Mitchell, Williams & Desmond, 2002).

Mapping of the vegetation systems of the Swan Coastal Plain conducted by Heddle (1980) place the survey area within the Karrakata complex-Central and South, which is described as predominately open forest of *Eucalyptus gomphocephala, E. marginata, Corymbia calophylla* and woodland of *E. marginata* and *Banksia spp*.

### 5.1.3 Edge Effects - Flora and Vegetation

The border between the proposed development and the remnant bushland will exert an edge effect on the existing flora and vegetation. Changes in micro-climate such as solar radiation, humidity, air and soil temperatures will alter vegetation structures, with species more tolerable of the new micro-climate being more successful. Edges will also provide opportunities for weed species to establish due to increased accessibility and/or presence of disturbed areas.

### 5.1.4 Increased Access

Impacts from uncontrolled access by pedestrian and vehicles (four-wheel drives, motorcycles etc.) to the adjacent Mather Reserve and remnant bushland may result in the following:

- illegal rubbish dumping
- introduce/increase presence of non-native weed species
- spread of dieback
- damage to vegetation as a result of driving/trampling/vandalism
- soil erosion and compaction.

### 5.1.5 Cleared Areas

Clearing of native vegetation may result in the following impacts:

- loss of fauna habitat
- fragmentation of remnant vegetation
- barriers to movement and/or dispersal of fauna
- direct mortality from construction activities
- increased erosion and/or surface runoff.

### 5.1.6 Viability and Ecological Linkage

Mather Reserve (50 ha), which lies directly east of Lot 41 and Lot 9100 will continue to provide suitable habitat for fauna in the immediate surrounding areas. It is set aside as an offset site and is managed in accordance with a Conservation Area Management Plan (CAMP) by the City of Wanneroo.

To the south, Wallangara Reserve and remnant bushland in adjacent Banksia Grove (Lot 8031) will form local ecological linkages to Neerabup National Park, which is part of a larger regional ecological linkage. Neerabup National Park, approximately 3 km west of the proposed sites will provide connectivity to facilitate ecological processes along the coastal plain and associated wetlands. As a national park, it will be protected under legislation and managed as a formal conservation reserve by the Parks and Wildlife Service under the Department of Biodiversity, Conservations and Attractions. Continuity of ecological linkages in the area still allows for movement of pollinators between reserves/bushland pockets to maintain genetic diversity of flora species present. Figure 5 below shows bush forever sites (hatched green), as well as parks and recreation areas (solid green) (City of Wanneroo, 2021).

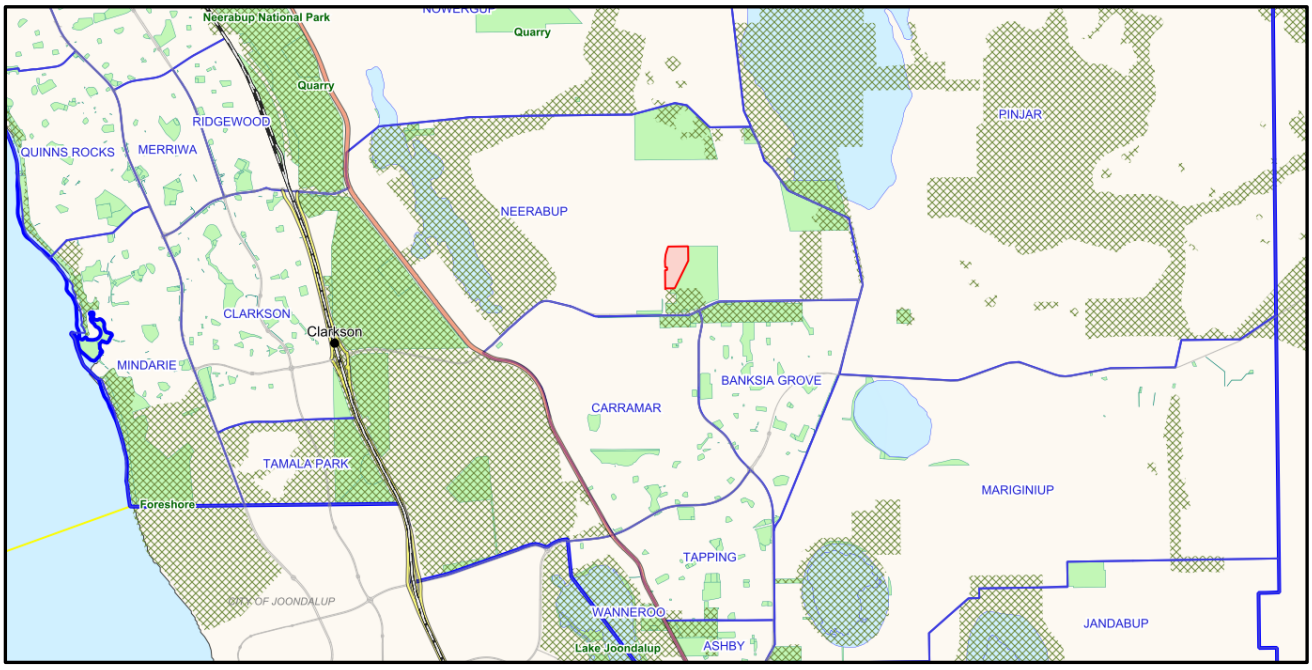


**Figure 5**: Ecological linkages (hatched and solid green), site (red). (Source: City of Wanneroo, 2021. Intramaps)

## 5.2 Vertebrate Fauna

### 5.2.1 Biodiversity Value of the Project Area

A total of 29 vertebrate species and 11 invertebrate species were recorded, with 23 occurring in Mather Drive Road Reserve, 16 in Lot 9100 and 16 in Lot 41. Of the vertebrate species, 20 birds, four reptiles and four mammal species were recorded (Table 9). Three conservation significant fauna species were recorded during the survey, Quenda (*Isoodon fusciventer*) (Priority 4) at Lot 41 and Mather Drive Road Reserve and Carnaby's Cockatoo (*Calyptorhynchus latirostris*–T/EN) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) at Lot 9100 and Mather Drive Road Reserve. Five introduced species were recorded, including the Red Fox which is a category C3 declared pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act) (WA). The Short-beaked Echidna (*Tachyglossus aculeatus*) was recorded at both Mather Drive Road Reserve and Lot 9100; this species is regionally significant as it is not common on the Swan Coastal Plain or near urban areas.

In addition to visual observation of Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) individuals at all three reserves, evidence of foraging was also noted in the form of chewed Jarrah (*Eucalyptus marginata*) nuts. Cockatoo habitat is present at all three reserves which is classified as poor condition at the Mather Drive Road Reserve site and good condition at Lot 41 and Lot 9100.

### 5.2.2 Ecological Functional Value at the Ecosystem Level

Ecosystems provide a myriad of services which are essential for the moderation of important environmental processes such as the purification of air and water, pollination of crops, nutrient cycling, protecting soils from erosion etc.

Proposed development of the three Mather Drive sites, which involves native vegetation clearing and eventual industrial subdivision, will potentially have an impact on the ecological functions. These potential impacts may lead to the reduction of the following:

- habitat provision
- regeneration and production of biomass leading to decreased food resource, pollination, seed dispersal
- nutrient/carbon cycling processes.

### 5.2.3 Condition of Fauna Habitat

The fauna habitat for Lot 9100 and Lot 41 is in good condition with vegetation and fauna habitat relatively intact with no major signs of disturbance throughout these sites. These two lots contain good quality understorey for small mammals, reptiles and invertebrates and good quality foraging and nesting canopy for native bird species. Lots 9100 and 41 also contained good microhabitats for invertebrates including the conservation significant species listed in Table 10, with their preferred habitat species, and the presence of logs and leaf litter for retiles and invertebrates. The fauna habitat for Mather Drive Road reserve is in a more degraded state, mainly attributed to previous clearing and a lack of overstorey species for nesting birds. The habitat present does however provide a good foraging area for fauna inhabiting the higher quality bushland surrounding the site, with many species captured feeding in this area on trail cameras, including conservation significant species.

### 5.2.4 Ecological Linkages

The adjacent Mather Reserve will continue to serve as an ecological linkage to facilitate fauna movement and genetic flow between the remnant bushland to the north and Wallangara Reserve and Banksia Grove to the south. Wallangara Reserve and Banksia Grove (Lot 8031), along with patches of remnant vegetation, including roadside trees, informal parks and gardens, forms a local ecological linkage to the regional ecological linkage along Neerabup National Park (Figure 6).

### 5.2.5 Size and Scale of the Proposed Disturbance

All three sites cover an approximate area of 18 ha.

- Mather Drive road reserve (1.17 ha)
- Lot 9100 (60) Mather Drive (16.2702 ha)
- Lot 41 (34) Mather Drive (0.5879 ha).

Due to the condition and relatively large size of Lot 9100, proposed clearing will potentially have the largest environmental impacts at this site. The shared boundary between Lot 9100 and Lot 41 to Mather Reserve may also cause disturbance during clearing, construction phase and subsequent ongoing impacts from future industrial operations.

Mitigation measures such as appropriate environmental monitoring (e.g. noise, dust, weeds etc.) and controls during and post construction can alleviate unnecessary pressures to surrounding areas. A fauna trapping and relocation program prior to land clearing to salvage fauna populations with the development envelope should be undertaken. Suitable offset revegetation can also be considered in relation to the size and scale of the proposed disturbance.

### 5.2.6 Abundance and Distribution of Similar Habitat in the Adjacent Areas

Adjacent remnant bushland in surrounding areas include:

- Mather Reserve (50 ha) to the east
- Wallangara Reserve (7 ha) to the south
- Banksia Grove (Lot 8031, 40 ha)/ Honey Possum Park (7.7 ha) to the southeast
- Flynn Park (1.8 ha) to the west.

Vegetation in adjacent Mather Reserve would most likely resemble and provide similar habitats to the three Mather Drive sites. It comprises of approximately 50 ha of native vegetation in Very Good to Excellent condition and provides high quality foraging habitat for black cockatoos. In addition, Mather Reserve also contained 15.2 ha of TEC FCT SCP 20a - *Banksia attenuata woodlands over species rich dense shrublands* (Eco Logical Australia, 2012).

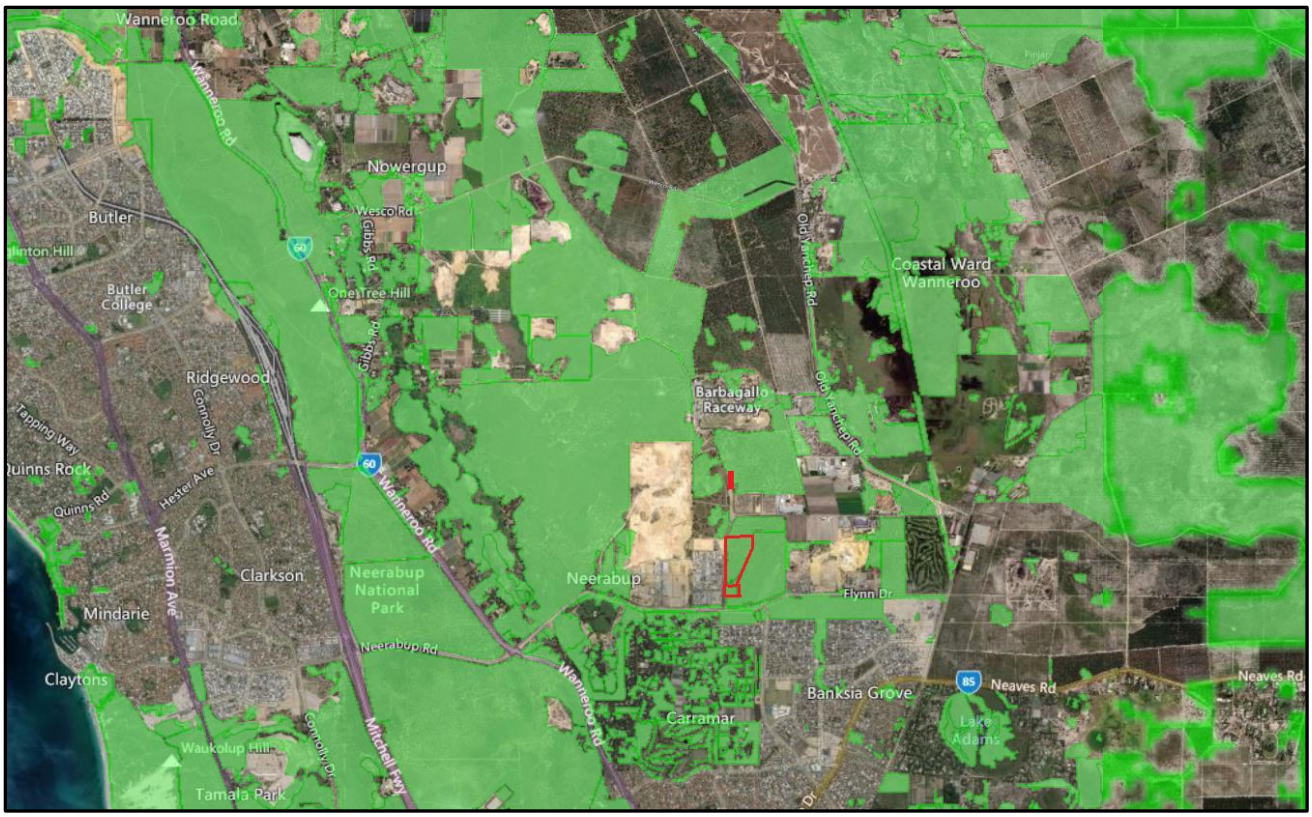


**Figure 6**: Extent of native remanent vegetation (green) (source: DPIRD, 2021)

### 5.2.7 Animal Deaths During the Clearing Process and Displacement of Fauna

Vegetation clearing during construction and development of the three Mather Drive sites may lead to injury and loss of terrestrial fauna. Due to the relatively high number of species, it is recommended that a fauna relocation/salvage program be put in place as a mitigating measure to reduce fauna mortalities during the clearing process. A pre-clearing trapping and relocation program using a range of traps (dry pitfalls, funnel traps, Elliot traps) can be employed to target and trap mammals, reptiles and amphibians. Opportunistic hand capture and removal of nesting birds, small terrestrial and arboreal fauna can be undertaken with larger mammals such as kangaroos encouraged to move out of the clearing area into adjacent remnant bushland. Clearing should commence immediately upon removal of traps to limit the chances of fauna recolonizing the trapped area. Fauna relocators/spotters can be deployed on site during clearing activities to ensure any stranded or injured wildlife are attended to immediately. Relocation sites would require assessment to ensure that habitat and ecology is suitable and sustainable for the relocated species.

The proposed fauna relocation program is also in line with the City's Local Planning Policy 3.3: Fauna Management, where the overarching policy objectives are to ensure the effective management of macro-fauna and avoiding unwanted impacts of displaced fauna due to habitat disturbance from development.

### 5.2.8 Reduction or loss of Activity Areas and Closure of Burrows

With the proposed clearing and developing of the three Mather Drive sites into industrial subdivisions, there will inevitably be a contraction in the remaining extent of native vegetation. Removal of suitable habitat may cause loss of activity through reduction/loss of food resources, increased predation by feral predators, altered fire regimes or simply the inability to recolonize cleared areas.

### 5.2.9 Edge Effects - Vertebrate Fauna

Edge effects can impact native fauna in several ways:

- improved access for feral species which may result in higher predation rates on native species and/or competition for resources
- barriers to dispersion and distribution resulting in restriction of gene flow
- habitat fragmentation
- change in microclimates which favours species more adaptable to disturbed areas along edges.

### 5.2.10 Introduced fauna and weeds

Introduced species can include both animals and plants that establish outside their natural range and becomes pests. Pest species can cause damage to native flora, fauna and degrade habitats which may eventually lead to the loss of native biodiversity.

Invasive fauna species such as the European Rabbit (*Oryctolagus cuniculus*) can degrade natural habitats through selective grazing, cause erosion issues by digging warren systems and compete directly with native fauna for resources. Feral predators like the Red Fox (*Vulpes vulpes*) and the Cat (*Felis catus)* place immense pressure and is one of the leading contributing factors to the decline of native species through predation. The Red Fox was recorded in the Mather Road Reserve site and should be managed by landowners as it is currently listed as a category C3 declared pest under the Bi*osecurity and Agriculture Management Act 2007* (WA). Continued feral animal management in surrounding conservation areas should be undertaken and monitored to ensure that the increased access to feral animals, due to the proposed land clearing, do not negatively impact native species.

Non-native weed species can exert negative impacts on local ecosystems through competition for resources including available nutrients, water, space and light. Aggressive weed species can successfully out-compete native plants resulting in a reduction of biodiversity, loss of integrity and vegetative structures.

### 5.2.11 Fire

Woody weeds and introduced grasses can alter fire regimes by potentially increasing fuel loads making fires more intense. Seasonality and frequency of fires may also be altered.

Landgate FireWatch database identified that the survey sites have not been burned for over two years. The closest fire event occurred approximately 10 km north-east of Mather Drive in 2019 (Landgate, 2019). Strategen (2017) developed a Bushfire Management Plan for the Neerabup Industrial Area, this included all three of the Mather Drive sites. Classified as Class B woodlands they represent a moderate to extreme bushfire risk, this is due to the proximately of dense vegetation to the west of the industrial area. LandCorp and DFES provide ongoing works to reduce fuel loads and maintain emergency access.

### 5.2.12 Anthropogenic Activity

Urbanization of the proposed site into an industrial area will lead to increased anthropogenic pressures from activities such as:

- illegal rubbish dumping
- impact of pets on native wildlife
- introduction of weed/ exotic flora

- trampling from uncontrolled access
- environmental pollution including light, noise, dust, gas emissions from industrial activities.

# 6.0 Management and Mitigation

## 6.1 Design Considerations and Preparation of Management Plans

Environmental management plans are often a requirement of a District/Local Structure Plans, or as a condition of subdivision approval. Environmental management plans should strive to address environmental related elements such as:

- biodiversity and native vegetation
- land and waste management
- air and water quality.

### 6.1.1 Flora and Vegetation Management Plan

A flora and vegetation management plan should aim to ensure best practices are employed during the land clearing stage of the development. It should identify potential retention areas, offset sites and minimize impacts to adjacent bushland areas. If revegetation is required in response to the development, a revegetation plan outlining the methods, implementation and management of the revegetation process should be included.

### 6.1.2 Fauna Management Plan

A fauna management plan should address the impacts on fauna and the corresponding mitigation measures in accordance with the City's Local Planning Policy 3.3 Fauna Management. It should include mitigating/avoidance strategies during vegetation clearing which may result in the removal and/or fragmentation of habitat. Fauna relocation/salvage prior to land clearing should be outlined clearly in the fauna management plan.

In addition, future long-term impacts to adjacent conservation areas, after subdivisions are completed, with the commencement of industrial activities should be addressed as well.

### 6.1.3 Construction Environmental Management Plan

A Construction Environmental Management Plan (CEMP) is required under Condition 2 of EPBC 2007/3479 for each stage of the development. The CEMP should aim to address the following:

- measures to avoid and mitigate any potential impacts to black cockatoos
- limit any potential spread of weeds and dieback
- demarcation conservation area to limit illegal access
- dust and erosion control measures
- changes in hydrological flow.

A CEMP for Meridian Business Park- Neerabup Industrial Area (Reference HPE Trim 20/799973[v2] was published by the City in June 2020 (City of Wanneroo, 2020a). All contractors working within the site will be required to ensure that their environmental management plans and procedures meet the obligations of this CEMP and any other regulatory requirements including general environmental management outside the requirements of Condition 2.

# 7.0 Discussion

## 7.1 Flora and Vegetation

While no threatened and priority species were recorded within Lot 41, Lot 9100 and Mather Road Reserve, all three sites contain a high flora diversity as represented by 167 flora species. This is consistent with the Jarrah, Banksia and Allocasuarina Woodland vegetation type on the Swan Coastal Plain. No threatened or priority ecological communities occur within the three sites with the closest known TEC (FCT SCP 20a – *Banksia attenuata* woodlands over species rich dense shrublands) occurring approximately 110 m south-east of Lot 9100.

The clearing and development of the three Mather Drive sites will lead to the direct loss of flora species, vegetative structures, and habitat. This contraction of native vegetation to the surrounding areas could potentially have a significant impact to the local flora and fauna assemblage. The City of Wanneroo has a strong commitment to protect biodiversity through several planning mechanisms including balancing the use of public open spaces and local conservation reserves as seen in Amendment No. 109 to DPS No. 2. Continued management and retention of 'Conservation' areas around the proposed development sites will alleviate potential impacts by continuing to serve as important local ecological linkages and providing suitable habitat for native fauna.

Mather Reserve comprises of a 50 ha onsite conservation area which is part of the agreed offset package for the development of Meridian Business Park within NIA. In addition, a 4 ha offsite offset in Mary Street, Wanneroo is also set aside to conserve the value of breeding and foraging habitat for threatened black cockatoo species and managed under Conservation Area Management Plan- Mather Reserve (53163) and Lot 24 Mary Street, Wanneroo (City of Wanneroo, 2020b).

## 7.2 Vertebrate fauna

Three conservation significant species were identified during the field survey, namely the Quenda, Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. Black cockatoo foraging habitat and potential habitat trees are also present on site.

Land clearing will have the potential to cause impacts and may lead to habitat destruction and subsequent loss in biodiversity and displacement of fauna. While ecological linkages and similar vegetation types and habitat occur in the areas surrounding the proposed development sites and may provide some mitigating effect, other impacts on vertebrate fauna which includes edge effects, closer proximity to urbanization and issues related with human-wildlife interactions have to be assessed.

# 8.0 Conclusions

It is acknowledged that any development will have an impact on the environment. Clearing of native vegetation and development into an industrial area will potentially have both short and long-term impacts on the environment and the surrounding areas. As such, it is important to ensure that suitable and viable remnant vegetation in the surrounding areas is retained and managed appropriately, with potential offset sites to be investigated in order to mitigate the loss of vegetation during clearing.

Retention of habitat trees on road verges and/or green spaces within proposed subdivisions may potentially alleviate impacts by providing refuge for biodiversity and maintaining some ecosystem services. However, it is often a challenge to incorporate high density industrial developments and their associated roads and services with retention of green spaces. As such, early planning and design should balance the competing priorities between urban development and green spaces, as far as practicable.

Vegetation clearing during construction and development of the three Mather Drive sites may also lead to injury and loss of terrestrial fauna. A fauna relocation/salvage program can be implemented to reduce fauna mortalities during the clearing process. A pre-clearing trapping and relocation program using a range of traps (dry pitfalls, funnel traps, Elliot traps) can be employed to target and trap smaller mammals, reptiles and amphibians. Opportunistic hand capture and removal of nesting birds, small terrestrial and arboreal fauna can be undertaken, with larger mammals such as kangaroos encouraged to move out of the clearing area into adjacent remnant bushland. Clearing should commence immediately upon removal of traps to limit the chances of fauna recolonising the trapped area. Fauna relocators/spotters can be deployed on site during clearing activities to ensure any stranded or injured wildlife gets attended to immediately. Relocation sites would require assessment to ensure that habitat and ecology is suitable and sustainable for the relocated species. Any fauna relocation works would need to be undertaken by suitably qualified individuals, with a fauna relocation licence obtained prior to any works being undertaken from the Department of Biodiversity, Conservation and Attractions.

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# Appendix 1: NatureMap Report

NatureMap
Mapping Western Australia's biodiversity

# NatureMap Species Report

*Created By Guest user on 31/08/2020*

| | |
|---|---|
| **Current Names Only** | Yes |
| **Core Datasets Only** | Yes |
| **Method** | 'By Circle' |
| **Centre** | 115° 47' 26" E,31° 40' 42" S |
| **Buffer** | 3km |
| **Group By** | Species Group |

| Species Group | Species | Records |
|---|---|---|
| Amphibian | 3 | 11 |
| Bird | 74 | 480 |
| Dicotyledon | 64 | 79 |
| Fungus | 1 | 3 |
| Invertebrate | 18 | 30 |
| Mammal | 6 | 9 |
| Monocotyledon | 29 | 37 |
| Reptile | 18 | 49 |
| **TOTAL** | **213** | **698** |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| **Amphibian** | | | | | |
| 1. | 25410 | *Heleioporus eyrei (Moaning Frog)* | | | |
| 2. | 25415 | *Limnodynastes dorsalis (Western Banjo Frog)* | | | |
| 3. | 25420 | *Myobatrachus gouldii (Turtle Frog)* | | | |
| **Bird** | | | | | |
| 4. | 24559 | *Acanthagenys rufogularis (Spiny-cheeked Honeyeater)* | | | |
| 5. | 24260 | *Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)* | | | |
| 6. | 24261 | *Acanthiza chrysorrhoa (Yellow-rumped Thornbill)* | | | |
| 7. | 24262 | *Acanthiza inornata (Western Thornbill)* | | | |
| 8. | 24560 | *Acanthorhynchus superciliosus (Western Spinebill)* | | | |
| 9. | 25535 | *Accipiter cirrocephalus (Collared Sparrowhawk)* | | | |
| 10. | 24282 | *Accipiter fasciatus subsp. fasciatus (Brown Goshawk)* | | | |
| 11. | 24561 | *Anthochaera carunculata (Red Wattlebird)* | | | |
| 12. | 24562 | *Anthochaera lunulata (Western Little Wattlebird)* | | | |
| 13. | 25554 | *Apus pacificus (Fork-tailed Swift, Pacific Swift)* | | IA | |
| 14. | 41324 | *Ardea modesta (great egret, white egret)* | | | |
| 15. | | *Barnardius zonarius* | | | |
| 16. | 25715 | *Cacatua roseicapilla (Galah)* | | | |
| 17. | 25716 | *Cacatua sanguinea (Little Corella)* | | | |
| 18. | 24727 | *Cacatua sanguinea subsp. westralensis (Little Corella)* | | | |
| 19. | 42307 | *Cacomantis pallidus (Pallid Cuckoo)* | | | |
| 20. | 25717 | *Calyptorhynchus banksii (Red-tailed Black-Cockatoo)* | | | |
| 21. | 24734 | *Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)* | | T | |
| 22. | 48400 | *Calyptorhynchus sp. (white-tailed black cockatoo)* | | T | |
| 23. | 25675 | *Colluricincla harmonica (Grey Shrike-thrush)* | | | |
| 24. | 24613 | *Colluricincla harmonica subsp. rufiventris (Grey Shrike-thrush)* | | | |
| 25. | 24399 | *Columba livia (Domestic Pigeon)* | Y | | |
| 26. | 25568 | *Coracina novaehollandiae (Black-faced Cuckoo-shrike)* | | | |
| 27. | 25592 | *Corvus coronoides (Australian Raven)* | | | |
| 28. | 24417 | *Corvus coronoides subsp. perplexus (Australian Raven)* | | | |
| 29. | 25595 | *Cracticus tibicen (Australian Magpie)* | | | |
| 30. | 24422 | *Cracticus tibicen subsp. dorsalis (White-backed Magpie)* | | | |
| 31. | 25596 | *Cracticus torquatus (Grey Butcherbird)* | | | |
| 32. | 24424 | *Cracticus torquatus subsp. torquatus (Grey Butcherbird)* | | | |
| 33. | 30901 | *Dacelo novaeguineae (Laughing Kookaburra)* | Y | | |
| 34. | 25673 | *Daphoenositta chrysoptera (Varied Sittella)* | | | |
| 35. | | *Eolophus roseicapillus* | | | |
| 36. | 24368 | *Eurostopodus argus (Spotted Nightjar)* | | | |
| 37. | 25622 | *Falco cenchroides (Australian Kestrel, Nankeen Kestrel)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 38. | 25623 | *Falco longipennis (Australian Hobby)* | | | |
| 39. | 25624 | *Falco peregrinus (Peregrine Falcon)* | | S | |
| 40. | 25530 | *Gerygone fusca (Western Gerygone)* | | | |
| 41. | 47962 | *Glyciphila melanops (Tawny-crowned Honeyeater)* | | | |
| 42. | 24443 | *Grallina cyanoleuca (Magpie-lark)* | | | |
| 43. | 24295 | *Haliastur sphenurus (Whistling Kite)* | | | |
| 44. | 47965 | *Hieraaetus morphnoides (Little Eagle)* | | | |
| 45. | 24491 | *Hirundo neoxena (Welcome Swallow)* | | | |
| 46. | 25659 | *Lichenostomus leucotis (White-eared Honeyeater)* | | | |
| 47. | 25661 | *Lichmera indistincta (Brown Honeyeater)* | | | |
| 48. | 25651 | *Malurus lamberti (Variegated Fairy-wren)* | | | |
| 49. | 25654 | *Malurus splendens (Splendid Fairy-wren)* | | | |
| 50. | 24552 | *Malurus splendens subsp. splendens (Splendid Fairy-wren)* | | | |
| 51. | 24583 | *Manorina flavigula (Yellow-throated Miner)* | | | |
| 52. | 25663 | *Melithreptus brevirostris (Brown-headed Honeyeater)* | | | |
| 53. | 24598 | *Merops ornatus (Rainbow Bee-eater)* | | | |
| 54. | 25693 | *Microeca fascinans (Jacky Winter)* | | | |
| 55. | 24738 | *Neophema elegans (Elegant Parrot)* | | | |
| 56. | 24407 | *Ocyphaps lophotes (Crested Pigeon)* | | | |
| 57. | 25680 | *Pachycephala rufiventris (Rufous Whistler)* | | | |
| 58. | 24624 | *Pachycephala rufiventris subsp. rufiventris (Rufous Whistler)* | | | |
| 59. | 25682 | *Pardalotus striatus (Striated Pardalote)* | | | |
| 60. | 48061 | *Petrochelidon nigricans (Tree Martin)* | | | |
| 61. | 48066 | *Petroica boodang (Scarlet Robin)* | | | |
| 62. | 24409 | *Phaps chalcoptera (Common Bronzewing)* | | | |
| 63. | 48071 | *Phylidonyris niger (White-cheeked Honeyeater)* | | | |
| 64. | 24596 | *Phylidonyris novaehollandiae (New Holland Honeyeater)* | | | |
| 65. | 25720 | *Platycercus icterotis (Western Rosella)* | | | |
| 66. | 24750 | *Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)* | | | |
| 67. | | *Purpureicephalus spurius* | | | |
| 68. | 48096 | *Rhipidura albiscapa (Grey Fantail)* | | | |
| 69. | 25614 | *Rhipidura leucophrys (Willie Wagtail)* | | | |
| 70. | 30948 | *Smicrornis brevirostris (Weebill)* | | | |
| 71. | 25589 | *Streptopelia chinensis (Spotted Turtle-Dove)* | Y | | |
| 72. | 25590 | *Streptopelia senegalensis (Laughing Turtle-Dove)* | Y | | |
| 73. | 24331 | *Tadorna tadornoides (Australian Shelduck, Mountain Duck)* | | | |
| 74. | 24845 | *Threskiornis spinicollis (Straw-necked Ibis)* | | | |
| 75. | 25549 | *Todiramphus sanctus (Sacred Kingfisher)* | | | |
| 76. | 25723 | *Trichoglossus haematodus (Rainbow Lorikeet)* | | | |
| 77. | 25765 | *Zosterops lateralis (Grey-breasted White-eye, Silvereye)* | | | |
| **Dicotyledon** | | | | | |
| 78. | 3409 | *Acacia lasiocarpa (Panjang)* | | | |
| 79. | 30032 | *Acacia saligna subsp. saligna* | | | |
| 80. | 1728 | *Allocasuarina fraseriana (Sheoak, Kondil)* | | | |
| 81. | 6311 | *Andersonia heterophylla* | | | |
| 82. | 20283 | *Astartea scoparia (Common Astartea)* | | | |
| 83. | 6331 | *Astroloma microcalyx (Native Cranberry)* | | | |
| 84. | 7046 | *Bellardia trixago (Bellardia)* | Y | | |
| 85. | 3710 | *Bossiaea eriocarpa (Common Brown Pea)* | | | |
| 86. | 5460 | *Calytrix fraseri (Pink Summer Calytrix)* | | | |
| 87. | 2957 | *Cassytha racemosa (Dodder Laurel)* | | | |
| 88. | 2889 | *Cerastium glomeratum (Mouse Ear Chickweed)* | Y | | |
| 89. | 4552 | *Comesperma confertum* | | | |
| 90. | 15511 | *Conospermum boreale* | | | |
| 91. | 1876 | *Conospermum incurvum (Plume Smokebush)* | | | |
| 92. | 1885 | *Conospermum triplinervium (Tree Smokebush)* | | | |
| 93. | 17104 | *Corymbia calophylla (Marri)* | | | |
| 94. | 6218 | *Daucus glochidiatus (Australian Carrot)* | | | |
| 95. | 4746 | *Diplopeltis huegelii* | | | |
| 96. | 3095 | *Drosera erythrorhiza (Red Ink Sundew)* | | | |
| 97. | 48710 | *Drosera micrantha* | | | |
| 98. | 3118 | *Drosera pallida (Pale Rainbow)* | | | |
| 99. | 31233 | *Drosera patens* | | P1 | |
| 100. | 30712 | *Drosera x sidjamesii* | | P1 | |
| 101. | 5615 | *Eucalyptus decipiens (Limestone Marlock, Moit)* | | | |
| 102. | 13541 | *Eucalyptus petrensis* | | | |
| 103. | 7323 | *Galium murale (Small Goosegrass)* | Y | | |
| 104. | 6143 | *Glischrocaryon aureum (Common Popflower)* | | | |
| 105. | 2175 | *Hakea lissocarpha (Honey Bush)* | | | |
| 106. | 2214 | *Hakea trifurcata (Two-leaf Hakea)* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 107. | 3961 | *Hardenbergia comptoniana (Native Wisteria)* | | | |
| 108. | 3016 | *Heliophila pusilla* | Y | | |
| 109. | 5135 | *Hibbertia hypericoides (Yellow Buttercups)* | | | |
| 110. | 45534 | *Hibbertia hypericoides subsp. hypericoides* | | | |
| 111. | 5162 | *Hibbertia racemosa (Stalked Guinea Flower)* | | | |
| 112. | 6222 | *Homalosciadium homalocarpum* | | | |
| 113. | 12859 | *Hovea trisperma var. trisperma* | | | |
| 114. | 6232 | *Hydrocotyle hispidula* | | | |
| 115. | 8086 | *Hypochaeris glabra (Smooth Catsear)* | Y | | |
| 116. | 4027 | *Jacksonia sericea (Waldjumi)* | | P4 | |
| 117. | 4044 | *Kennedia prostrata (Scarlet Runner)* | | | |
| 118. | 5850 | *Leptospermum laevigatum (Coast Teatree)* | Y | | |
| 119. | 6427 | *Leucopogon parviflorus (Coast Beard-heath)* | | | |
| 120. | 6456 | *Lysinema ciliatum (Curry Flower)* | | | |
| 121. | 5920 | *Melaleuca huegelii (Chenille Honeymyrtle)* | | | |
| 122. | 18598 | *Melaleuca systena* | | | |
| 123. | 8106 | *Millotia tenuifolia (Soft Millotia)* | | | |
| 124. | 2309 | *Petrophile serruriae* | | | |
| 125. | 4675 | *Phyllanthus calycinus (False Boronia)* | | | |
| 126. | 5243 | *Pimelea ferruginea* | | | |
| 127. | 8177 | *Podolepis lessonii* | | | |
| 128. | 42022 | *Poranthera moorokatta* | | P2 | |
| 129. | 8231 | *Sonchus oleraceus (Common Sowthistle)* | Y | | |
| 130. | 4207 | *Sphaerolobium medium* | | | |
| 131. | 4713 | *Stachystemon axillaris (Leafy Stachystemon)* | | | |
| 132. | 4733 | *Stackhousia monogyna* | | | |
| 133. | 2918 | *Stellaria media (Chickweed)* | Y | | |
| 134. | 25831 | *Stylidium araeophyllum (Stilt Walker)* | | | |
| 135. | 7745 | *Stylidium junceum (Reed Triggerplant)* | | | |
| 136. | 13127 | *Stylidium maritimum* | | P3 | |
| 137. | 4256 | *Templetonia retusa (Cockies Tongues)* | | | |
| 138. | 6280 | *Trachymene pilosa (Native Parsnip)* | | | |
| 139. | 4292 | *Trifolium campestre (Hop Clover)* | Y | | |
| 140. | 8254 | *Urospermum picroides (False Hawkbit)* | Y | | |
| 141. | 8255 | *Ursinia anthemoides (Ursinia)* | Y | | |
| **Fungus** | | | | | |
| 142. | | *Phytophthora cinnamomi* | | | |
| **Invertebrate** | | | | | |
| 143. | | *Aname mainae* | | | |
| 144. | | *Araneus senicaudatus* | | | |
| 145. | | *Austracantha minax* | | | |
| 146. | | *Australomimetus ovidi* | | | |
| 147. | | *Eriophora biapicata* | | | |
| 148. | 33977 | *Hylaeus globuliferus (woolybush bee)* | | P3 | |
| 149. | | *Isopeda leishmanni* | | | |
| 150. | | *Lampona cylindrata* | | | |
| 151. | | *Latrodectus hasseltii* | | | |
| 152. | | *Maratus pavonis* | | | |
| 153. | | *Nephila edulis* | | | |
| 154. | | *Oecobius navus* | | | |
| 155. | | *Ommatoiulus moreletii* | | | |
| 156. | | *Oratemnus curtus* | | | |
| 157. | | *Pholcus phalangioides* | | | |
| 158. | 33992 | *Synemon gratiosa (Graceful Sunmoth)* | | P4 | |
| 159. | | *Venator immansueta* | | | |
| 160. | | *Venatrix pullastra* | | | |
| **Mammal** | | | | | |
| 161. | 24041 | *Felis catus (Cat)* | Y | | |
| 162. | 48588 | *Isoodon fusciventer (Quenda, southwestern brown bandicoot)* | | P4 | |
| 163. | 24132 | *Macropus fuliginosus (Western Grey Kangaroo)* | | | |
| 164. | 24223 | *Mus musculus (House Mouse)* | Y | | |
| 165. | 48022 | *Notamacropus irma (Western Brush Wallaby)* | | P4 | |
| 166. | 24085 | *Oryctolagus cuniculus (Rabbit)* | Y | | |
| **Monocotyledon** | | | | | |
| 167. | 184 | *Aira caryophyllea (Silvery Hairgrass)* | Y | | |
| 168. | 231 | *Avellinia michelii* | Y | | |
| 169. | 244 | *Briza maxima (Blowfly Grass)* | Y | | |
| 170. | 11038 | *Caladenia bicalliata* | | | |

| | Name ID | Species Name | Naturalised | Conservation Code | [1]Endemic To Query Area |
|---|---|---|---|---|---|
| 171. | 1595 | *Caladenia hirta (Sugar Candy Orchid)* | | | |
| 172. | 1162 | *Cartonema philydroides* | | | |
| 173. | 1134 | *Centrolepis polygyna (Wiry Centrolepis)* | | | |
| 174. | 1418 | *Conostylis aculeata (Prickly Conostylis)* | | | |
| 175. | 11826 | *Conostylis aculeata subsp. aculeata* | | | |
| 176. | 10916 | *Cyrtostylis huegelii* | | | |
| 177. | 1646 | *Eriochilus dilatatus (White Bunny Orchid)* | | | |
| 178. | 1520 | *Gladiolus caryophyllaceus (Wild Gladiolus)* | Y | | |
| 179. | 467 | *Lagurus ovatus (Hare's Tail Grass)* | Y | | |
| 180. | 925 | *Lepidosperma angustatum* | | | |
| 181. | 945 | *Lepidosperma squamatum* | | | |
| 182. | 1228 | *Lomandra hermaphrodita* | | | |
| 183. | 1231 | *Lomandra maritima* | | | |
| 184. | | *Pterostylis aff. nana* | | | |
| 185. | 17267 | *Pterostylis brevisepala* | | | |
| 186. | 12217 | *Pterostylis sanguinea* | | | |
| 187. | 1556 | *Romulea rosea (Guildford Grass)* | Y | | |
| 188. | 982 | *Schoenus clandestinus* | | | |
| 189. | 992 | *Schoenus grandiflorus (Large Flowered Bogrush)* | | | |
| 190. | 1018 | *Schoenus subfascicularis* | | | |
| 191. | 1036 | *Tetraria octandra* | | | |
| 192. | 1338 | *Thysanotus manglesianus (Fringed Lily)* | | | |
| 193. | 1361 | *Tricoryne elatior (Yellow Autumn Lily)* | | | |
| 194. | 724 | *Vulpia myuros (Rat's Tail Fescue)* | Y | | |
| 195. | 1256 | *Xanthorrhoea preissii (Grass tree, Palga)* | | | |

## Reptile

| | | | | | |
|---|---|---|---|---|---|
| 196. | 24980 | *Christinus marmoratus (Marbled Gecko)* | | | |
| 197. | 24918 | *Crenadactylus ocellatus subsp. ocellatus (Clawless Gecko)* | | | |
| 198. | 30893 | *Cryptoblepharus buchananii* | | | |
| 199. | 30899 | *Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)* | | | |
| 200. | 25027 | *Ctenotus australis* | | | |
| 201. | 25039 | *Ctenotus fallens* | | | |
| 202. | 24999 | *Delma grayii* | | | |
| 203. | 25296 | *Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)* | | | |
| 204. | 25119 | *Hemiergis quadrilineata* | | | |
| 205. | 25133 | *Lerista elegans* | | | |
| 206. | 25165 | *Lerista praepedita* | | | |
| 207. | 25005 | *Lialis burtonis* | | | |
| 208. | 25184 | *Menetia greyii* | | | |
| 209. | 25192 | *Morethia obscura* | | | |
| 210. | 25511 | *Pseudonaja affinis (Dugite)* | | | |
| 211. | 25008 | *Pygopus lepidopodus (Common Scaly Foot)* | | | |
| 212. | 24943 | *Strophurus spinigerus subsp. inornatus* | | | |
| 213. | 25207 | *Tiliqua rugosa subsp. rugosa* | | | |

**Conservation Codes**
T - Rare or likely to become extinct
X - Presumed extinct
IA - Protected under international agreement
S - Other specially protected fauna
1 - Priority 1
2 - Priority 2
3 - Priority 3
4 - Priority 4
5 - Priority 5

[1] For NatureMap's purposes, species flagged as endemic are those whose records are wholely contained within the search area. Note that only those records complying with the search criterion are included in the calculation. For example, if you limit records to those from a specific datasource, only records from that datasource are used to determine if a species is restricted to the query area.

# Appendix 2: PMST report

Australian Government
Department of the Environment and Energy

# EPBC Act Protected Matters Report

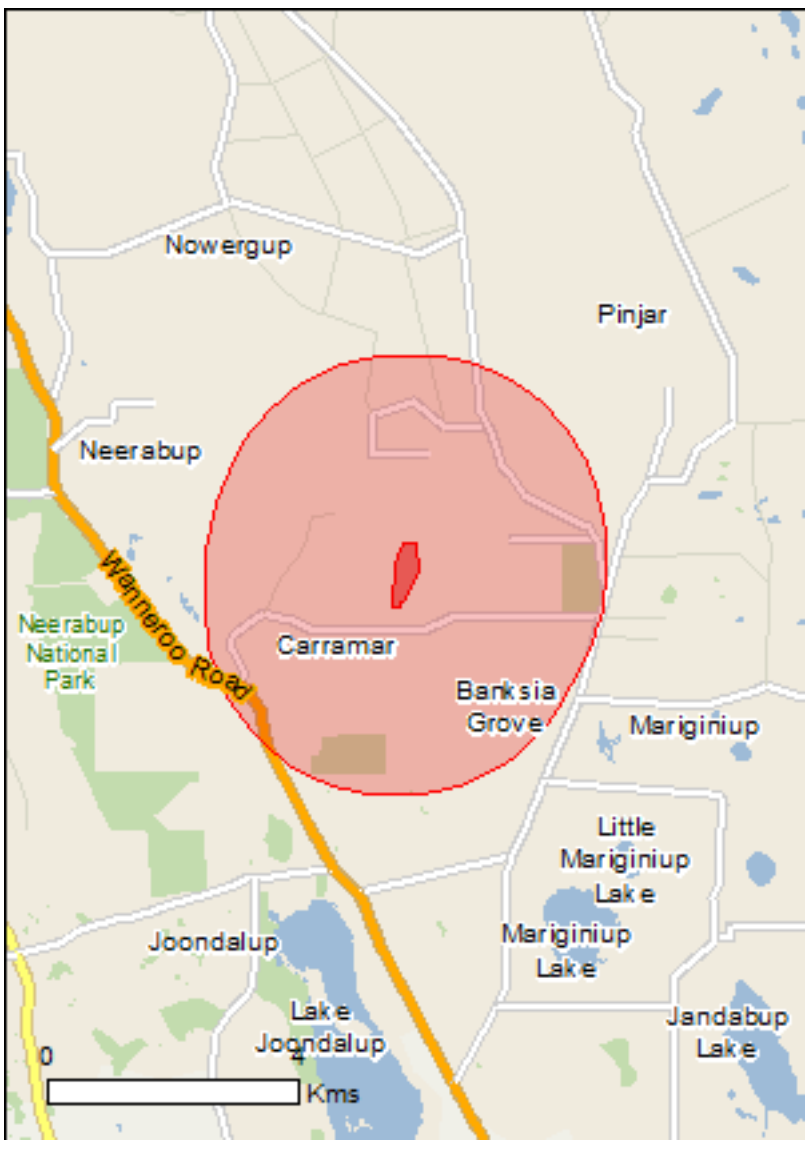
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

Report created: 04/08/20 13:04:36

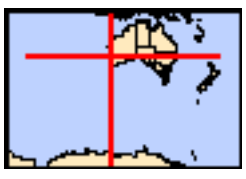





This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2010

Coordinates

Buffer: 3.0Km



# Summary

## Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

| | |
|---|---|
| World Heritage Properties: | None |
| National Heritage Places: | None |
| Wetlands of International Importance: | None |
| Great Barrier Reef Marine Park: | None |
| Commonwealth Marine Area: | None |
| Listed Threatened Ecological Communities: | 2 |
| Listed Threatened Species: | 19 |
| Listed Migratory Species: | 10 |

## Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

| | |
|---|---|
| Commonwealth Land: | 1 |
| Commonwealth Heritage Places: | None |
| Listed Marine Species: | 15 |
| Whales and Other Cetaceans: | None |
| Critical Habitats: | None |
| Commonwealth Reserves Terrestrial: | None |
| Australian Marine Parks: | None |

## Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

| | |
|---|---|
| State and Territory Reserves: | None |
| Regional Forest Agreements: | None |
| Invasive Species: | 34 |
| Nationally Important Wetlands: | None |
| Key Ecological Features (Marine) | None |

# Details

## Matters of National Environmental Significance

### Listed Threatened Ecological Communities [ Resource Information ]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

| Name | Status | Type of Presence |
|---|---|---|
| Banksia Woodlands of the Swan Coastal Plain ecological community | Endangered | Community likely to occur within area |
| Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community | Critically Endangered | Community likely to occur within area |

### Listed Threatened Species [ Resource Information ]

| Name | Status | Type of Presence |
|---|---|---|
| **Birds** | | |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area |
| Calyptorhynchus banksii naso<br>Forest Red-tailed Black-Cockatoo, Karrak [67034] | Vulnerable | Species or species habitat likely to occur within area |
| Calyptorhynchus latirostris<br>Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523] | Endangered | Species or species habitat known to occur within area |
| Leipoa ocellata<br>Malleefowl [934] | Vulnerable | Species or species habitat likely to occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Rostratula australis<br>Australian Painted Snipe [77037] | Endangered | Species or species habitat likely to occur within area |
| Sternula nereis nereis<br>Australian Fairy Tern [82950] | Vulnerable | Species or species habitat may occur within area |
| **Insects** | | |
| Hesperocolletes douglasi<br>Douglas' Broad-headed Bee, Rottnest Bee [66734] | Critically Endangered | Species or species habitat may occur within area |
| **Mammals** | | |

| Name | Status | Type of Presence |
|---|---|---|
| Dasyurus geoffroii<br>Chuditch, Western Quoll [330] | Vulnerable | Species or species habitat likely to occur within area |
| **Plants** | | |
| Andersonia gracilis<br>Slender Andersonia [14470] | Endangered | Species or species habitat may occur within area |
| Anigozanthos viridis subsp. terraspectans<br>Dwarf Green Kangaroo Paw [3435] | Vulnerable | Species or species habitat may occur within area |
| Caladenia huegelii<br>King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309] | Endangered | Species or species habitat may occur within area |
| Diuris micrantha<br>Dwarf Bee-orchid [55082] | Vulnerable | Species or species habitat may occur within area |
| Diuris purdiei<br>Purdie's Donkey-orchid [12950] | Endangered | Species or species habitat may occur within area |
| Drakaea elastica<br>Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753] | Endangered | Species or species habitat likely to occur within area |
| Drakaea micrantha<br>Dwarf Hammer-orchid [56755] | Vulnerable | Species or species habitat may occur within area |
| Eucalyptus argutifolia<br>Yanchep Mallee, Wabling Hill Mallee [24263] | Vulnerable | Species or species habitat known to occur within area |
| Melaleuca sp. Wanneroo (G.J. Keighery 16705)<br>[89456] | Endangered | Species or species habitat may occur within area |

| Listed Migratory Species | | [ Resource Information ] |
|---|---|---|
| * Species is listed under a different scientific name on the EPBC Act - Threatened Species list. | | |
| Name | Threatened | Type of Presence |
| **Migratory Marine Birds** | | |
| Apus pacificus<br>Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| **Migratory Terrestrial Species** | | |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| **Migratory Wetlands Species** | | |
| Actitis hypoleucos<br>Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Calidris acuminata<br>Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris canutus<br>Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea<br>Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area |

| Name | Threatened | Type of Presence |
|---|---|---|
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Numenius madagascariensis | | |
| Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus | | |
| Osprey [952] | | Species or species habitat likely to occur within area |
| Tringa nebularia | | |
| Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Other Matters Protected by the EPBC Act

### Commonwealth Land [ Resource Information ]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

| Name |
|---|
| Commonwealth Land - |

### Listed Marine Species [ Resource Information ]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

| Name | Threatened | Type of Presence |
|---|---|---|
| Birds | | |
| Actitis hypoleucos | | |
| Common Sandpiper [59309] | | Species or species habitat known to occur within area |
| Apus pacificus | | |
| Fork-tailed Swift [678] | | Species or species habitat likely to occur within area |
| Ardea alba | | |
| Great Egret, White Egret [59541] | | Species or species habitat likely to occur within area |
| Ardea ibis | | |
| Cattle Egret [59542] | | Species or species habitat may occur within area |
| Calidris acuminata | | |
| Sharp-tailed Sandpiper [874] | | Species or species habitat known to occur within area |
| Calidris canutus | | |
| Red Knot, Knot [855] | Endangered | Species or species habitat may occur within area |
| Calidris ferruginea | | |
| Curlew Sandpiper [856] | Critically Endangered | Species or species habitat likely to occur within area |
| Calidris melanotos | | |
| Pectoral Sandpiper [858] | | Species or species habitat may occur within area |
| Haliaeetus leucogaster | | |
| White-bellied Sea-Eagle [943] | | Species or species habitat likely to occur |

| Name | Threatened | Type of Presence within area |
|---|---|---|
| Merops ornatus<br>Rainbow Bee-eater [670] | | Species or species habitat may occur within area |
| Motacilla cinerea<br>Grey Wagtail [642] | | Species or species habitat may occur within area |
| Numenius madagascariensis<br>Eastern Curlew, Far Eastern Curlew [847] | Critically Endangered | Species or species habitat may occur within area |
| Pandion haliaetus<br>Osprey [952] | | Species or species habitat likely to occur within area |
| Rostratula benghalensis (sensu lato)<br>Painted Snipe [889] | Endangered* | Species or species habitat likely to occur within area |
| Tringa nebularia<br>Common Greenshank, Greenshank [832] | | Species or species habitat likely to occur within area |

## Extra Information

### Invasive Species [ Resource Information ]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

| Name | Status | Type of Presence |
|---|---|---|
| Birds | | |
| Acridotheres tristis<br>Common Myna, Indian Myna [387] | | Species or species habitat likely to occur within area |
| Anas platyrhynchos<br>Mallard [974] | | Species or species habitat likely to occur within area |
| Carduelis carduelis<br>European Goldfinch [403] | | Species or species habitat likely to occur within area |
| Columba livia<br>Rock Pigeon, Rock Dove, Domestic Pigeon [803] | | Species or species habitat likely to occur within area |
| Passer domesticus<br>House Sparrow [405] | | Species or species habitat likely to occur within area |
| Passer montanus<br>Eurasian Tree Sparrow [406] | | Species or species habitat likely to occur within area |
| Streptopelia chinensis<br>Spotted Turtle-Dove [780] | | Species or species habitat likely to occur within area |
| Streptopelia senegalensis<br>Laughing Turtle-dove, Laughing Dove [781] | | Species or species habitat likely to occur within area |

| Name | Status | Type of Presence |
|---|---|---|
| Sturnus vulgaris<br>Common Starling [389] | | Species or species habitat likely to occur within area |
| **Mammals** | | |
| Bos taurus<br>Domestic Cattle [16] | | Species or species habitat likely to occur within area |
| Canis lupus familiaris<br>Domestic Dog [82654] | | Species or species habitat likely to occur within area |
| Felis catus<br>Cat, House Cat, Domestic Cat [19] | | Species or species habitat likely to occur within area |
| Funambulus pennantii<br>Northern Palm Squirrel, Five-striped Palm Squirrel [129] | | Species or species habitat likely to occur within area |
| Mus musculus<br>House Mouse [120] | | Species or species habitat likely to occur within area |
| Oryctolagus cuniculus<br>Rabbit, European Rabbit [128] | | Species or species habitat likely to occur within area |
| Rattus norvegicus<br>Brown Rat, Norway Rat [83] | | Species or species habitat likely to occur within area |
| Rattus rattus<br>Black Rat, Ship Rat [84] | | Species or species habitat likely to occur within area |
| Vulpes vulpes<br>Red Fox, Fox [18] | | Species or species habitat likely to occur within area |
| **Plants** | | |
| Asparagus aethiopicus<br>Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425] | | Species or species habitat likely to occur within area |
| Asparagus asparagoides<br>Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473] | | Species or species habitat likely to occur within area |
| Brachiaria mutica<br>Para Grass [5879] | | Species or species habitat may occur within area |
| Cenchrus ciliaris<br>Buffel-grass, Black Buffel-grass [20213] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera<br>Bitou Bush, Boneseed [18983] | | Species or species habitat may occur within area |
| Chrysanthemoides monilifera subsp. monilifera<br>Boneseed [16905] | | Species or species habitat likely to occur within area |
| Genista sp. X Genista monspessulana<br>Broom [67538] | | Species or species habitat may occur within area |
| Lantana camara<br>Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red | | Species or species habitat likely to occur |

| Name | Status | Type of Presence |
|---|---|---|
| Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892] | | within area |
| Lycium ferocissimum<br>African Boxthorn, Boxthorn [19235] | | Species or species habitat likely to occur within area |
| Olea europaea<br>Olive, Common Olive [9160] | | Species or species habitat may occur within area |
| Pinus radiata<br>Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780] | | Species or species habitat may occur within area |
| Rubus fruticosus aggregate<br>Blackberry, European Blackberry [68406] | | Species or species habitat likely to occur within area |
| Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii<br>Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497] | | Species or species habitat likely to occur within area |
| Salvinia molesta<br>Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665] | | Species or species habitat likely to occur within area |
| Tamarix aphylla<br>Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018] | | Species or species habitat likely to occur within area |
| Reptiles | | |
| Hemidactylus frenatus<br>Asian House Gecko [1708] | | Species or species habitat likely to occur within area |

# Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods.  Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc).  In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

# Coordinates

-31.684492 115.789122,-31.679379 115.789208,-31.676786 115.790496,-31.676823 115.792556,-31.680256 115.792641,-31.683908 115.790624,-31.683908 115.789981,-31.684638 115.789981,-31.684638 115.789122,-31.684492 115.789122

# Acknowledgements

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-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.


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# Appendix 3: Flora species list

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Fabaceae | **Acacia iteaphylla* | | | x |
| Poaceae | **Aira cupaniana* | | | x |
| Asteraceae | **Arctotheca calendula* | x | x | x |
| Poaceae | **Avena barbata* | x | | |
| Brassicaceae | **Brassica tournefortii* | | x | x |
| Poaceae | **Briza maxima* | x | x | x |
| Aizoaceae | **Carpobrotus edulis* | x | x | x |
| Crassulaceae | **Crassula glomerata* | | | x |
| Poaceae | **Ehrharta calycina* | x | x | x |
| Poaceae | **Eragrostis curvula* | | x | |
| Geraniaceae | **Erodium botrys* | | x | x |
| Euphorbiaceae | **Euphorbia terracina* | x | x | |
| Iridaceae | **Gladiolus caryophyllaceus* | x | x | x |
| Asteraceae | **Hypochaeris glabra* | x | x | x |
| Lamiaceae | **Lavandula* sp. | | x | |
| Asteraceae | **Leontodon rhagadioloides* | | x | |
| Poaceae | **Lolium rigidulum* | | | x |
| Fabaceae | **Lotus subbiflorus* | | | x |
| Fabaceae | **Lupinus cosentinii* | | x | |
| Primulaceae | **Lysimachia arvensis* | | | x |
| Asteraceae | **Monoculus monstrosus* | | | x |
| Onagraceae | **Oenothera drummondii* | | x | |
| Fabaceae | **Ornithopus compressus* | | | x |
| Asteraceae | **Osteospermum ecklonis* | x | | |
| Oxalidaceae | **Oxalis purpurea* | | | x |
| Geraniaceae | **Pelargonium capitatum* | | x | x |
| Phytolaccaceae | **Phytolacca octandra* | | | x |
| Euphorbiaceae | **Ricinus communis* | | x | |
| Asteraceae | **Sonchus oleraceus* | x | | x |
| Asphodelaceae | **Trachyandra divaricata* | | x | |

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Fabaceae | **Trifolium arvense* | | | x |
| Fabaceae | **Trifolium campestre* | | x | x |
| Asteraceae | **Urospermum picroides* | | | x |
| Asteraceae | **Ursinia anthemoides* | x | x | x |
| Poaceae | **Vulpia myuros* | | | x |
| Campanulaceae | **Wahlenbergia capensis* | | | x |
| Fabaceae | *Acacia applanata* | x | x | |
| Fabaceae | *Acacia cochlearis* | | x | |
| Fabaceae | *Acacia huegelii* | x | | |
| Fabaceae | *Acacia pulchella* | x | x | x |
| Fabaceae | *Acacia saligna* | | x | x |
| Fabaceae | *Acacia sessilis* | x | | |
| Fabaceae | *Acacia pulchella* var. *pulchella* | x | | |
| Proteaceae | *Adenanthos cygnorum* | | x | |
| Restionaceae | *Alexgeorgea nitens* | x | x | |
| Casuarinaceae | *Allocasuarina fraseriana* | x | x | x |
| Haemodoraceae | *Anigozanthos humilis* | | x | |
| Haemodoraceae | *Anigozanthos manglesii* | | x | |
| Poaceae | *Austrostipa flavescens* | x | | |
| Poaceae | *Austrostipa flavescens* | | x | |
| Proteaceae | *Banksia attenuata* | x | x | x |
| Proteaceae | *Banksia dallanneyi* | | x | x |
| Proteaceae | *Banksia grandis* | x | x | |
| Proteaceae | *Banksia menziesii* | | x | x |
| Proteaceae | *Banksia sessilis* | | x | |
| Pittosporaceae | *Billardiera fraseri* | | x | |
| Fabaceae | *Bossiaea eriocarpa* | x | x | x |
| Fabaceae | *Bossiaea ornata* | | x | |
| Ericaceae | *Brachyloma preissii* | x | x | |
| Colchicaceae | *Burchardia congesta* | x | x | |
| Orchidaceae | *Caladenia arenicola* | x | x | |
| Orchidaceae | *Caladenia flava* | x | x | |

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Montiaceae | *Calandrinia corrigioloides* | | x | |
| Dasypogonaceae | *Calectasia narragara* | x | | |
| Myrtaceae | *Calytrix flavescens* | | x | |
| Aizoaceae | *Carpobrotus virescens* | | x | |
| Myrtaceae | *Chamelaucium uncinatum* | | x | |
| Polygalaceae | *Comesperma calymega* | | x | |
| Ericaceae | *Conostephium pendulum* | x | | |
| Haemodoraceae | *Conostylis aculeata* | x | x | x |
| Haemodoraceae | *Conostylis juncea* | | x | |
| Haemodoraceae | *Conostylis setigera* | x | x | |
| Hemerocallidaceae | *Corynotheca micrantha* | | x | x |
| Goodeniaceae | *Dampiera linearis* | | x | |
| Fabaceae | *Daviesia nudiflora* | x | x | |
| Fabaceae | *Daviesia physodes* | | x | |
| Fabaceae | *Daviesia triflora* | | x | |
| Restionaceae | *Desmocladus flexuosus* | x | x | x |
| Hemerocallidaceae | *Dianella revoluta* | | x | x |
| Orchidaceae | *Diuris corymbosa* | x | x | |
| Orchidaceae | *Drakaea glyptodon* | | x | |
| Droseraceae | *Drosera erythrorhiza* | x | x | |
| Droseraceae | *Drosera menziesii* | x | x | |
| Droseraceae | *Drosera pallida* | x | | |
| Droseraceae | *Drosera pulchella* | | x | |
| Orchidaceae | *Elythranthera brunonis* | | x | |
| Myrtaceae | *Eremaea pauciflora* | x | x | |
| Orchidaceae | *Eriochilus dilatatus* | x | x | |
| Myrtaceae | *Eucalyptus marginata* | x | x | x |
| Fabaceae | *Gastrolobium capitatum* | x | x | |
| Fabaceae | *Gompholobium tomentosum* | x | x | |
| Haemodoraceae | *Haemodorum laxum* | x | x | x |
| Haemodoraceae | *Haemodorum paniculatum* | | | x |
| Haemodoraceae | *Haemodorum spicatum* | x | | x |

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Proteaceae | *Hakea lissocarpha* | x | | x |
| Proteaceae | *Hakea prostrata* | | x | x |
| Proteaceae | *Hakea trifurcata* | x | x | |
| Fabaceae | *Hardenbergia comptoniana* | x | x | x |
| Dilleniaceae | *Hibbertia huegelii* | x | x | |
| Dilleniaceae | *Hibbertia hypericoides* | x | x | x |
| Dilleniaceae | *Hibbertia racemosa* | | x | |
| Fabaceae | *Hovea trisperma* | x | x | |
| Violaceae | *Hybanthus calycinus* | x | | |
| Myrtaceae | *Hypocalymma robustum* | x | x | |
| Restionaceae | *Hypolaena exsulca* | | x | |
| Fabaceae | *Isotropis cuneifolia* | x | x | |
| Fabaceae | *Jacksonia furcellata* | | | x |
| Fabaceae | *Jacksonia sternbergiana* | x | x | x |
| Fabaceae | *Kennedia prostrata* | x | x | |
| Asteraceae | *Lagenophora huegelii* | x | x | |
| Restionaceae | *Lepidobolus preissianus* | | x | |
| Cyperaceae | *Lepidosperma scabrum* | x | x | |
| Cyperaceae | *Lepidosperma* sp. | x | | |
| Orchidaceae | *Leporella fimbriata* | | x | |
| Campanulaceae | *Lobelia tenuior* | x | | |
| Asparagaceae | *Lomandra caespitosa* | | x | x |
| Asparagaceae | *Lomandra hermaphrodita* | x | x | |
| Asparagaceae | *Lomandra micrantha* | | | x |
| Asparagaceae | *Lomandra nigricans* | x | | |
| Asparagaceae | *Lomandra preissii* | x | x | |
| Asparagaceae | *Lomandra sericea* | x | x | |
| Asparagaceae | *Lomandra suaveolens* | | x | |
| Restionaceae | *Lyginia imberbis* | | x | |
| Cyperaceae | *Mesomelaena pseudostygia* | x | x | |
| Asteraceae | *Olearia axillaris* | x | x | |
| Rubiaceae | *Opercularia vaginata* | x | x | |

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Iridaceae | *Orthrosanthus laxus* | | x | |
| Iridaceae | *Patersonia occidentalis* | x | x | |
| Proteaceae | *Persoonia saccata* | x | | |
| Proteaceae | *Petrophile linearis* | x | x | |
| Proteaceae | *Petrophile macrostachya* | x | x | |
| Myrtaceae | *Philotheca spicata* | x | x | |
| Haemodoraceae | *Phlebocarya ciliata* | | x | |
| Phyllanthaceae | *Phyllanthus calycinus* | | | x |
| Thymelaeaceae | *Pimelea sulphurea* | x | x | |
| Asteraceae | *Podotheca gnaphalioides* | x | x | |
| Phyllanthaceae | *Poranthera microphylla* | | x | |
| Orchidaceae | *Pterostylis recurva* | x | | |
| Orchidaceae | *Pterostylis* sp. | x | x | |
| Amaranthaceae | *Ptilotus manglesii* | x | x | |
| Amaranthaceae | *Ptilotus polystachyus* | | x | x |
| Orchidaceae | *Pyrorchis nigricans* | x | x | |
| Goodeniaceae | *Scaevola canescens* | x | | |
| Goodeniaceae | *Scaevola repens* | x | | x |
| Cyperaceae | *Schoenus clandestinus* | | | x |
| Cyperaceae | *Schoenus curvifolius* | x | x | |
| Solanaceae | *Solanum symonii* | | | x |
| Asparagaceae | *Sowerbaea laxiflora* | x | x | |
| Proteaceae | *Stirlingia latifolia* | x | x | |
| Stylidiaceae | *Stylidium adpressum* | | x | |
| Stylidiaceae | *Stylidium androsaceum* | | x | |
| Stylidiaceae | *Stylidium carnosum* | | X | |
| Stylidiaceae | *Stylidium ciliatum* | x | x | |
| Stylidiaceae | *Stylidium neurophyllum* | x | | |
| Ericaceae | *Styphelia xerophylla* | | | x |
| Cyperaceae | *Tetraria octandra* | x | x | |
| Orchidaceae | *Thelymitra crinita* | x | | |
| Asparagaceae | *Thysanotus manglesianus* | | x | |

| Family | Species Name (taxon) | Lot 41 | Lot 9100 | Mather Dr Rd Res |
|---|---|---|---|---|
| Asparagaceae | *Thysanotus multiflorus* | | x | |
| Asparagaceae | *Thysanotus thyrsoideus* | x | | |
| Araliaceae | *Trachymene pilosa* | x | x | |
| Hemerocallidaceae | *Tricoryne tenella* | x | | |
| Campanulaceae | *Wahlenbergia preissii* | | x | |
| Asteraceae | *Waitzia suaveolens* | x | x | |
| Xanthorrhoeaceae | *Xanthorrhoea brunonis* | x | x | x |
| Xanthorrhoeaceae | *Xanthorrhoea preissii* | x | x | x |
| Apiaceae | *Xanthosia huegelii* | x | x | |

# Appendix 4: Aboriginal Heritage Inquiry Report

# Aboriginal Heritage Inquiry System

## List of Registered Aboriginal Sites



### Search Criteria

No Registered Aboriginal Sites in Custom search area - Polygon - 115.785105467647°E, 31.6885199950133°S (GDA94) : 115.785105467647°E, 31.6666800394771°S (GDA94) : 115.801499129147°E, 31.6666800394771°S (GDA94) : 115.801499129147°E, 31.6885199950133°S (GDA94) : 115.785105467647°E, 31.6885199950133°S (GDA94)

### Disclaimer

The *Aboriginal Heritage Act 1972* preserves all Aboriginal sites in Western Australia whether or not they are registered. Aboriginal sites exist that are not recorded on the Register of Aboriginal Sites, and some registered sites may no longer exist.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you email the details to the Department at AboriginalHeritage@dplh.wa.gov.au and we will make every effort to rectify it as soon as possible.

### South West Settlement ILUA Disclaimer

Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Whadjuk People Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Mines, Industry Regulation and Safety (DMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage at AboriginalHeritage@dplh.wa.gov.au.

### Copyright



### Coordinate Accuracy

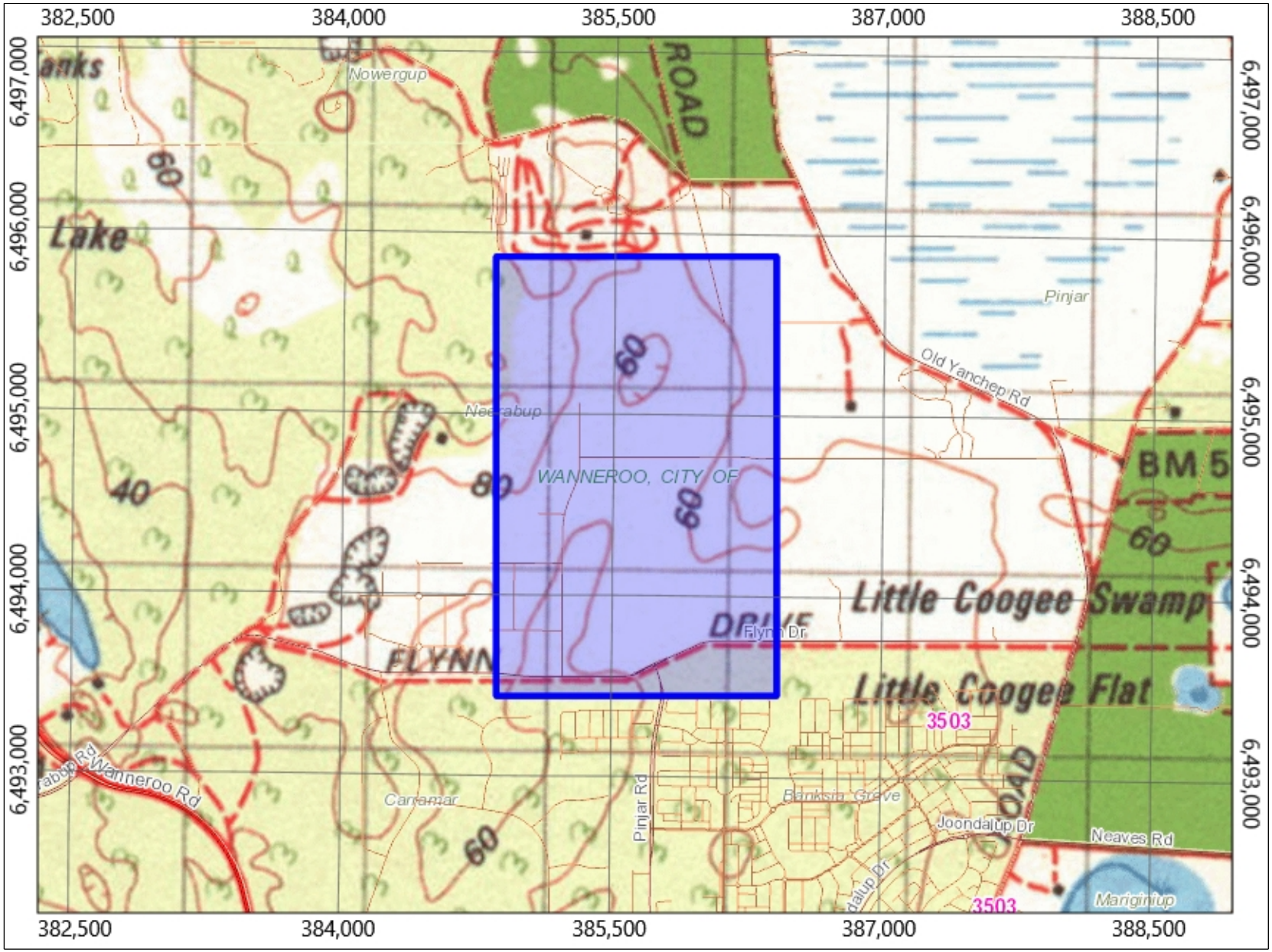
Coordinates (Easting/Northing metres) are based on the GDA 94 Datum. Accuracy is shown as a code in brackets following the coordinates.

Department of Planning, Lands and Heritage

# Aboriginal Heritage Inquiry System

## Map of Registered Aboriginal Sites

For further important information on using this information please see the Department of Planning, Lands and Heritage's Disclaimer statement at https://www.dplh.wa.gov.au/about-this-website




### Legend

- Registered Aboriginal Site
- Search Area
- Town
- Road
- River
- Local Government Authority

1.24 kilometres

Map Scale 1 : 37,700

MGA Zone 50 (GDA94)