Desktop Review and Impact Assessment of Fireworks Display - Manning Park Spring Fair Case Study

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Prepared for

City of Cockburn

INTEGRATE SUSTAINABILITY PTY LTD

integrate SUSTAINABILITY

Desktop Review and Impact Assessment of Fireworks Displays – Manning Park Spring Fair Case Study

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Executive Summary

Integrate Sustainability Pty Ltd (ISPL) was engaged by the City of Cockburn to undertake a desktop review and environmental impact assessment (EIA) on fireworks displays using the Manning Park Spring Fair as a Case Study. This report presents potential impacts associated with fireworks displays in general as well as assessing the potential impact associated with the minor firework display at Manning Park. EIA involves examining and identifying potential consequences or impacts to the environment and is used as a decision making and planning tool. To complete the EIA, a desktop review of approximately 85 documents was undertaken to ascertain the context of the local environment of the City of Cockburn and understand the environmental impacts associated with fireworks albeit on a larger scale than Manning Park. These findings are summarised below.

Local Environment

The City of Cockburn is located approximately 15km south of Perth on the Swan Coastal Plain and occupies a land area of 168km^2. Cockburn is largely residential but also includes industrial areas, wetlands and a number of areas of conservation significance such as Beeliar and Jandakot Regional Parks, Woodman Point and several Reserves.

The Rotary Spring Fair is held annually at Manning Park on the last Sunday of October and finishes with a mid and ground level firework display ranging in height from approximately 5m to 140m above ground level and lasting approximately 10 minutes. The display is considered minor in comparison to other displays occurring in the metropolitan area and is the only fireworks display undertaken by the City.

Manning Park is situated in the north-western section of the City of Cockburn, approximately 500m from the coast, north of Azelia Road. Manning Park forms part of the Beeliar Regional Park and is surrounded by residential properties and land developments on all sides except the west which hosts a small industrial area. A NatureMap search was conducted for the City of Cockburn area which identified a total 456 fauna species, 34 of which are of conservation significance. An *Environmental Protection and Biodiversity Conservation Act 1999* Protected Matters Report identified 59 conservation significant fauna species as potentially utilising the area.

Fireworks and Environmental Impacts

Fireworks consist of several main chemical components which react in a designed manner to produce the desired array of bright light and accompanying sound effect. The general components include gun powder (potassium nitrate), sulphur, charcoal, an oxidising agent (usually either nitrate, chlorate, or perchlorate) and metal salts to produce various colours.

Firework displays have been known to result in an increase of particulate matter concentrations of 5 to 20 times background concentrations and remain in the atmosphere for between 16 hours and up to a month. Increased concentrations of particulate matter may cause respiratory difficulties even after only short durations of exposure. Despite the literature focusing on human health impacts, similar impacts are considered likely for fauna. The scale of these impacts is linked to the volume of fireworks and duration of the display. Manning Park fireworks are considered to be at the lower end of the scale.

Oxidising agents used in fireworks can contaminate soil, groundwater and surface water within a reasonable radius of the display. Oxidising agents such as perchlorate are readily water-soluble and return to the ground through precipitation thereby impacting the quality of soil, groundwater and surface water and the health of organisms through uptake. Perchlorate concentrations have been found to decrease over time following firework displays, however the impact of accumulation has not been studied. Areas in which firework displays happen regularly would be expected show a gradual increase of perchlorate levels over time as the gradual

increase in perchlorate concentration is likely to make dilution less effective. Again this will be impacted by the volume of fireworks and duration of the display.

Many different types of metals are included in fireworks to create colourful displays. The combustion of fireworks releases metals into the atmosphere resulting in elevated metal concentrations for up to several days which only decrease due to dissipation. Metals released from fireworks may be deposited in soils or waterbodies or breathed in by humans or fauna. Many of the metals used in fireworks have carcinogenic or toxic impacts on humans, flora and fauna.

Fireworks have been recorded reaching noise levels up to 190dB and averaging 90dB for the duration of the display. These noise levels can damage human hearing and cause a behavioural reaction in animals. While in most cases animals exhibit shivering or cowering, mainly stationary responses, some species exhibit flight responses which can lead to injury and death in extreme cases through blunt-force trauma. Birds, primarily seabirds have been observed abandoning their nests and, in some cases, not returning following the completion of the display. In an effort to minimise impacts the Manning Park fireworks include ground level silent fireworks in the display.

Other impacts from fireworks include light pollution, waste and litter generation and fire. Limited research has been conducted on the impact of light generated from firework displays, however it is likely to cause a flight response in birds. Paper or cardboard packaging is likely to not be entirely combusted during the explosion of the firework device and therefore will return to the ground creating a source of pollution or choking hazard for fauna. The Manning Park display tries to limit any waste by using fibre glass cartridges in many of the displays that are collected and used over and over again.

Impact Assessment

The research indicates that fireworks cause plumes of pollution as a result of combustion. The smoke generated contains traces of particulate matter, metals, non-combusted residues such as oxidising agents and inorganic by-products, a number of which are known carcinogens or impact healthy respiratory functioning. Based on the size and duration of the Rotary Spring Fair firework display, the height at which most of the display takes place and the likely weather conditions, it is unlikely the fireworks display will have a medium or long-term impact on the City of Cockburn air quality, although impact is likely to occur in the short term.

Metals and other particulates produced from or remaining after the combustion of the fireworks are likely to be deposited in Manning Park, either over the land or into the lake. It is unlikely the Rotary Spring Fair firework display will produce contaminants in concentrations high enough to impact the quality of the soil and water, and health of flora and fauna, but there is the potential for contaminates to accumulate over time causing long-term impacts.

Loud noises such as those produced from fireworks are likely to cause a fear response for most animals. However, single short-duration events such as fireworks are unlikely to result in chronic stress, which could result in a significant behavioural and physiological response and impacts. Other than immediate responses such as flight, running or cowering, medium or long-term impacts are unlikely. The greatest risk perceived to fauna is that caused by blunt-force trauma injuries to animals trying to flee the area. Of further consideration is the similarities between fireworks and thunderstorms which are likely to affect fauna in a similar manner although atmospheric conditions such as changes in barometric pressure may provide some warning.

Packaging from the fireworks is expected to be littered about Manning Park following the display. A previous impact study identified litter remained for up to several days following the event; this litter is considered a short-term impact. It is to be acknowledged correspondence from the City of Cockburn, implies additional efforts have since been made to reduce litter such as the use of biodegradable packaging, the collection and recycling of tubes, which are fibre glass rather than paper and, minimising packaging and reuse of other

equipment where possible. The risk of fire was the final impact considered for the City of Cockburn firework display and based on the information available, this risk appears to be appropriately managed.

Recommendations

Given that a number of practises are currently in place to minimise many the impacts it is not currently possible to definitively state whether the annual fireworks display at Manning Park should or should not continue. The only long-term impacts identified by this assessment relate to the potential accumulation of contaminants over time, however this impact could be quantified by determining the actual contaminants within the specific chemical constituents and their concentrations likely to be produced by the fireworks display. Consequently, the following recommendations are made based on the outcomes of the impact assessment:

- In the long term consider relocating the fireworks display to an area without an adjacent wetland area or natural bushland such as a sporting oval;
- Keep ground level displays as far from spectators as possible and downwind if practical.
- Obtain a list of likely contaminants including the specific oxidising agent, potential metal particulates and any other potentially harmful products from the firework supplier;
- If the fireworks are to continue at Manning Park, undertake analysis of the soil at the launch site and water from Manning Lake prior to and immediately following the fireworks display for likely contaminants to quantify the impact of pollutants and consider establishing a long-term monitoring program;
- Monitor the Manning Park area subsequent to the fireworks display to identify any injured wildlife;
- Increase the number of silent fireworks used in future events;
- Continue to alert pet owners well in advance of the event of the time and duration of the display and provide information for managing pet behaviour during the event; and
- Continue to ensure all waste is collected and appropriately disposed of following the event.

Although appreciated by many, the overall public perception of fireworks is changing, and more people are becoming concerned about the impact on animals and the appropriateness of the displays given the increasing devastation caused by bushfires. For this reason, ISPL suggests the City of Cockburn trial alternatives, should funding permit, in the coming years with a goal to potentially phase out the use of fireworks in the future. Alternatives may include:

- Light shows and projections;
- Water shows;
- Drone shows; or
- Other musical acts and performances.

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1 Introduction

Following concerns that a fireworks display may have a negative impact on the environment, Integrate Sustainability Pty Ltd (ISPL) was engaged by the City of Cockburn (the City) to undertake a desktop review, environmental impact assessment and prepare a report highlighting the potential impacts from the firework display using the Manning Park Rotary Spring Fair as a Case Study.

1.1 Project Overview

To mark the end of the Rotary Spring Fair held annually at Manning Pack on the last Sunday of October, the City of Cockburn conducts a small fireworks display lasting approximately 10 minutes. The display consists of a number of mid-level fireworks with aerial displays ranging in height from approximately 10m to 140m above ground level, with the majority being approximately 75m in the air. The contractor engaged by the City utilises fireworks manufactured with specific chemicals and compounds to ensure the lowest possible smoke production and minimal debris. Typically, the packaging of the fireworks comprises biodegradable carboard, and all remaining fireworks tubes, packaging, wiring and cannisters are collected and recycled following the show (City of Cockburn personal communication).

Manning Park is considered part of the larger Beeliar Regional Park that encompasses Manning Lake and the limestone ridge to the west of the wetland. Situated north of Azelia Road (Figure 1.1) in the suburb of Hamilton Hill, the park and wetlands host an array of fauna and flora, as well as open spaces and recreational areas utilised by the City of Cockburn and residents for major events and outings (City of Cockburn, 2020).

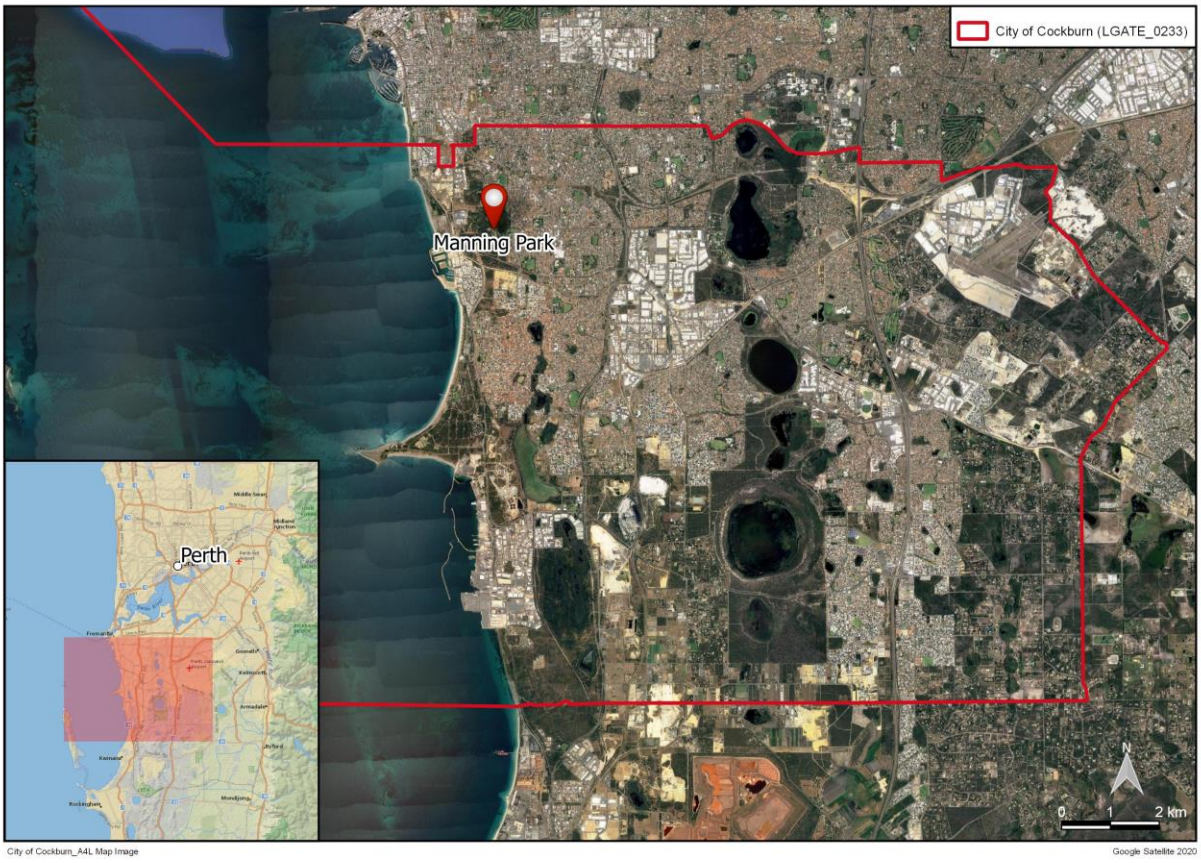

Figure 1.1 Location of Manning Park

The Cockburn Rotary Spring Fair has been hosted by the City of Cockburn in collaboration with the Cockburn Rotary for at least 25 years. The Spring Fair is widely recognised as one of the City's most popular events hosting a variety of stalls, food vendors, a sideshow alley and entertainment (City of Cockburn, 2020). The Fair has an annual attendance of approximately 4,000 people.

1.2 Approach and Methodology

Environmental Impact Assessment (EIA) is a process which involves examining and identifying potential consequences or impacts to the environment (Wathern, 2013). EIA is used as a decision making and planning tool for urban development as it can provide decision makers with an indication of the consequences related to an activity. The EIA process includes initial identification of the environmental values of the area proposed for development or activity; either through a desktop assessment summarising the information already known about the area, or using targeted surveys where the environmental values are unknown or there are potential significant environmental impacts.

This is followed by identification and discussion of the potential impacts or risk pathways associated with the local environment and proposed activities. Where risks and impacts are identified, management measures and recommendations for monitoring are proposed to prevent or minimise those impacts should the activity proceed. This information is then used by decision makers to determine whether the activity should occur or not.

The EIA prepared by ISPL for the City of Cockburn comprised of:

- A desktop review of approximately 85 documents including scientific literature, government reports, articles from public interest and animal welfare groups, news organizations and other websites to ascertain the context of the local environment of the City of Cockburn and understand the potential environmental impacts associated with fireworks;
- Identification and assessment of the environmental impacts associated with fireworks in terms of the local environment, duration and size of the Spring Fair fireworks display;
- Recommendations to further quantify the identified impacts and undertake additional actions not already in place to mitigate potential impacts; and
- Identification of alternative entertainment options in lieu of fireworks, if appropriate and cost effective.

1.3 Assumptions and Limitations

While the available scientific literature considered in this EIA addressed firework displays of a much larger intensity, duration and frequency than the display at the Cockburn Rotary Spring Fair; no scientific literature was available considering events of a similar small scale as the spring fair. However, limited publicly available information such as news articles and websites were located, providing a level of assessment for small scale firework events. Consideration was given to the size of the event and local environmental values, using the contextual understanding included in this report to identify potential impacts associated with the annual Cockburn Rotary Spring Fair firework display. While the size of the display has been considered, the proprietary chemical makeup of the fireworks is unknown and as such all contaminants presented in the literature were taken into consideration for the EIA.

ISPL also acknowledges a number of the sources reviewed during this EIA are not peer reviewed and may incorporate opinions of individuals or companies. These sources were included in the impact assessment to identify *all* possible impacts attributed to fireworks; rather than only those presented in the scientific literature. This report therefore presents all the risks and identified potential impacts of the fireworks display for the City of Cockburn using an unbiased approach. It also acknowledges the actions currently being undertaken to minimise impacts.

2 Desktop Assessment

As part of the EIA process, a desktop review was completed to provide an overview of the local environmental and potential environmental impacts of fireworks. These are described in the subsections below.

2.1 Local Environment

The City of Cockburn is located approximately 15km south of Perth on the Swan Coastal Plain and occupies a land area of 168km^2. The City is largely residential but also includes industrial areas, wetlands and a number of areas of conservation significance such as Beeliar and Jandakot Regional Parks, Woodman Point and a number of Reserves. The City of Cockburn includes two Wetlands of National Importance - Thomsons Lake (Ramsar listed) and Gibbs Road Swamp System, along with a number of other wetlands shown in Figure 2.1. Two Threatened Ecological Communities (TECs) - the 'Banksia Woodlands of the Swan Coastal Plan' and the 'Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain' are located within these regional parks.

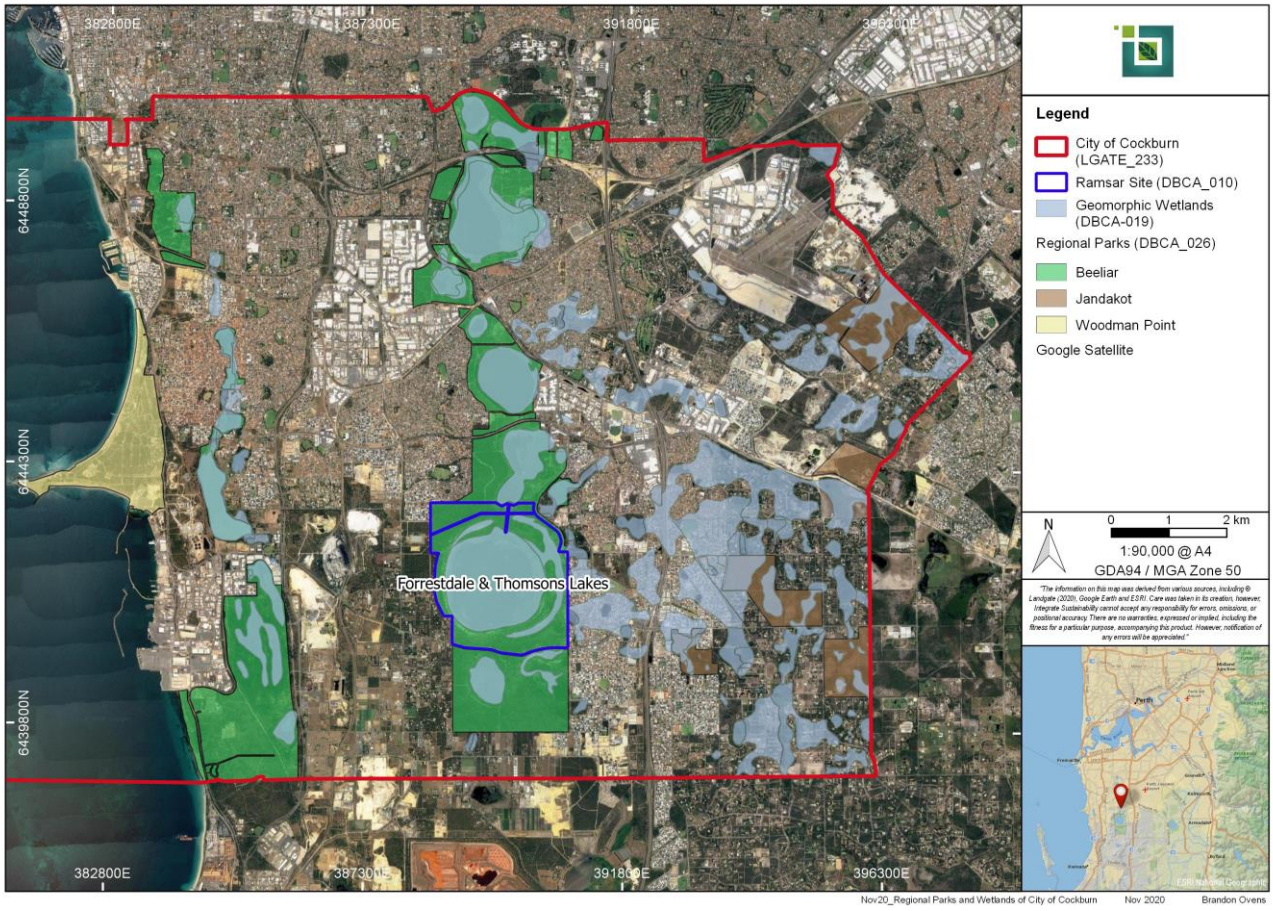

Figure 2.1 Regional Parks and Wetlands of the City of Cockburn

Vegetation of the area ranges from coastal dune complexes in the west, to open woodlands consisting mainly of Jarrah (*Eucalyptus marginata*), Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) in the east (DPIRD, 2020).

2.1.1 Manning Park

Manning Park is situated in the north-western section of the City of Cockburn, approximately 500m from the coast (Figure 1.1). Manning Park is surrounded by residential properties and land developments on all sides except the west, which comprises a small industrial area hosting commercial enterprises including WA Salt Group, South Fremantle Power Station, Schutz Australia and Aussie Fluid Power.

Manning Park is home to the Manning Lake Reserve which is part of the Beeliar Regional Park and is a Bush Forever site. Manning Lake flora ranges from wetland dependent vegetation such as Freshwater Paperbark (*Melaleuca rhapiophylla* and *Baumea juncea*), to upland vegetation such as the Chenille Honey Myrtle (*Melaleuca huegelii*) and Parrot bush (*Dryandra sessilis*). A variety of native fauna can be found at Manning Lake, including frogs, reptiles and birds. These include the Motorbike Frog (*Littoria moorei*), Western Bluetongue (*Tiliqua rugosa rugosa*) and Sacred Ibis (*Threskiornis aethiopica*) and Carnaby's Black Cockatoo. (City of Cockburn, 2020).

2.1.2 Fauna

A NatureMap report identified 456 fauna species occurring within the City of Cockburn boundaries (Table 2.1). Of these, 34 species are of conservation significance under the *Environmental Protection and Biodiversity Conservation* (EPBC) *Act 1999* and/or the *Biodiversity Conservation* (BC) *Act 2016*. The EPBC Act Protected Matters Report identified 59 conservation significant species as potentially utilising the area. Conservation significant species, excluding migratory species, fish, whales, and dolphins are shown in Table 2.2. Both the NatureMap and EPBC Act Protected Matters Reports are included in Appendix 1.

Table 2.1 Number of Species Recorded in the City of Cockburn

Class	Amphibians	Birds	Fish	Invertebrates	Mammals	Reptiles	Total
No. Species	9	236	18	107	29	57	**456**

Table 2.2 Conservation Significant Species Recorded in the City of Cockburn

Scientific name	Common name	BC Status (WA)	EPBC Status (National)
Birds			
Calidris tenuirostris	Great Knot	CR	CR & MI
Calidris ferruginea	Curlew Sandpiper	CR	CR & MI
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	CR	CR & MI
Diomedea dabbenena	Tristan Albatross	CR	EN & MI
Calidris canutus	Red Knot	EN	EN & MI
Calyptorhynchus	White-tailed Black Cockatoo	EN	EN
Calyptorhynchus latirostris	Carnaby's Cockatoo	EN	EN
Calyptorhynchus baudinii	Baudin's Cockatoo	EN	EN
Charadrius mongolus	Lesser Sand Plover, Mongolian Plover	EN	EN & MI
Diomedea sanfordi	Northern Royal Albatross	EN	EN & MI
Rostratula australis	Australian Painted Snipe	EN	EN
Macronectes giganteus	Southern Giant-Petrel	MI	EN & MI
Anous tenuirostris melanops	Australian Lesser Noddy	VU	EN
Phoebetria fusca	Sooty Albatross	EN	VU
Thalassarche carteri	Indian Yellow-nosed Albatross	EN	VU & MI
Thalassarche melanophris	Black-browed Albatross	EN	VU & MI
Calyptorhynchus banksii naso	Forest Red-tailed Black Cockatoo	VU	VU
Charadrius leschenaultia	Greater Sand Plover, Large Sand Plover	VU	VU & MI
Diomedea epomophora	Southern Royal Albatross	VU	VU & MI
Diomedea exulans	Wandering Albatross	VU	VU & MI
Thalassarche cauta	Shy Albatross	VU	VU & MI
Thalassarche impavida	Campbell Albatross	VU	VU & MI
Macronectes halli	Northern Giant Petrel	MI	VU & MI

Scientific name	Common name	BC Status (WA)	EPBC Status (National)
Tyto novaehollandiae	Masked Owl (southwest)	P3	-
Ixobrychus dubius	Australian Little Bittern	P4	-
Oxyura australis	Blue-billed Duck	P4	-
Phaethon rubricauda	Red-tailed Tropicbird	P4 & MI	MI
Thinornis rubricollis	Hooded Plover, Hooded Dotterel	P4	-
Tringa brevipes	Grey-tailed Tattler	P4 & MI	MI
Mammal			
Myrmecobius fasciatus	Numbat, walpurti	EN	EN
Dasyurus geoffroii	Chuditch, Western Quoll	VU	VU
Neophoca cinerea	Australian Sea-lion	VU	VU
Setonix brachyurus	Quokka	VU	VU
Falsistrellus mackenziei	Western False Pipistrelle, Western Falsistrelle	P4	-
Hydromys chrysogaster	Water-rat, rakali	P4	-
Isoodon fusciventer	Quenda, Southern Brown Bandicoot	P4	-
Notamacropus eugenii derbianus	Tammar Wallaby	P4	-
Notamacropus irma	Western Brush Wallaby	P4	-
Reptile			
Caretta caretta	Loggerhead Turtle	EN	EN & MI
Dermochelys coriacea	Leatherback Turtle	VU	EN & MI
Chelonia mydas	Green Turtle	VU	VU & MI
Natator depressus	Flatback Turtle	VU	VU & MI
Lerista lineata	Perth Slider, Lined Skink	P3	-
Neelaps calonotos	Black-striped Snake, Black-striped Burrowing Snake	P3	-
Invertebrate			
Westralunio carteri	Carter's Freshwater Mussel	VU	VU
Botaurus poiciloptilus	Barrow Island Bogidomma amphipod	VU	-
Throscodectes xiphos	Stylet Bush Cricket, Stylet Throsco (Jandakot)	P1	-
Idiosoma sigillatum	Swan Coastal Plain Shield-backed Trapdoor Spider	P3	-
Leioproctus contrarius	A Short-tongued Bee	P3	-
Synemon gratiosa	Graceful Sunmoth	P4	-

CR = Critically Endangered, EN = Endangered, VU = Vulnerable, MI = Migratory

2.1.3 Air Quality

Much of the City of Cockburn is located within the Kwinana Air Quality Buffer Zone. The Buffer Zone exists to manage industrial emissions and maintain a healthy air quality for those working and living in the area (Kwinana Industries Council, 2020). Limited information is currently available on the air emissions within the City of Cockburn; however, a review of the National Pollutant Inventory (NPI) website indicates 12 facilities within the City of Cockburn trigger the NPI reporting threshold (Department of Environment and Energy, 2019). Emission reporting from these facilities, lists 56 emitted substances, with the most commonly reported substances included in Table 2.3. Most emissions are derived from waste treatment, disposal, and remediation services; cement, lime, plaster and concrete production; and mineral metal and chemical sales. A full list of reported emissions is available in Appendix 2.

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Table 2.3 Emissions of Most Commonly Reported Substances for Facilities in the City of Cockburn 2018/2019 (Department of Environment and Energy, 2019)

Substance	Air (kg)	Land (kg)	Water (kg)
Acetone	12,000	-	-
Arsenic & compounds	2.3	0.059	35
Benzene	69	0.15	-
Beryllium & compounds	1.1	0.02	-
Carbon monoxide	840,000	-	-
Chlorine & compounds	4,200	2,500	-
Oxides of Nitrogen	870,000	-	-
Particulate Matter 10µm (PM10)	62,000	-	-
Polycyclic aromatic hydrocarbons (B[a]Peq)	2.5		
Toluene	210	1.7	
Total nitrogen			1,400,000
Total phosphorous			330,000
Total Volatile Organic Compounds	150,000		

Due to its proximity to the Kwinana Industrial Area and the commercial operations within the City of Cockburn, it is expected the air quality within the City of Cockburn is impacted to some degree. The Department of Water and Environmental Regulation (DWER) has a real time air quality monitoring station at South Lake. Despite the reported emissions from within the City of Cockburn and Kwinana, data from this location indicates the air quality is 'very good' according to the air quality index for Western Australia (DWER, 2020). Air quality data for South Lake from the 2015 calendar year is available in the Air Quality Monitoring in Perth Region Fact Sheet; from which the following approximate ranges have been deduced (DWER, 2016) and shown in Table 2.4.

Table 2.4 South Lake Air Quality Data (2015) (DWER, 2016)

Air Quality Factor	Duration	Range (Minimum and Maximum)		Maximum Concentration (NEPM)
		Minimum	Maximum	
Carbon monoxide	8hr average	0.25ppm (January)	1.75ppm (February)	9.0ppm
Nitrogen dioxide	1hr average	0.02ppm (January)	0.045ppm (September)	0.12ppm
Ozone	1hr average	0.03ppm (June)	0.065ppm (January)	0.1ppm
Sulphur dioxide	1hr average	0.01ppm (July)	0.04ppm (February)	0.2ppm
Particles as PM10	daily average	20µg/m^3 (August)	55µg/m^3 (February)	50µg/m^3
Particles as PM2.5	daily average	12µg/m^3 (March)	34µg/m^3 (February and May).	25µg/m^3

According to this 2015 data, carbon monoxide, nitrogen dioxide, ozone and sulphur dioxide averages all remain below the maximum concentrations outlined in the National Environment Protection (Ambient Air Quality) Measure (NEPM). PM10 and PM2.5 exceed the NEPM maximum concentrations of 50µg/m^3 and 25µg/m^3 respectively in months where peak concentrations were observed. Despite this, yearly averages remain below maximum concentration levels.

2.2 Fireworks

Fireworks essentially are small pyrotechnical missiles that explode in the sky creating loud explosions and bursts of brightly coloured light (GrrlScientist, 2019). Fireworks consist of several main chemical components

(Figure 2.2) which react in a designed manner to produce the desired array of bright light and accompanying sound effect.

The two most important components of a firework device are the gun powder explosive, which is generally a mix of potassium nitrate (KNO_3), sulphur and charcoal, and the oxidising agent usually either nitrate, chlorate, or perchlorate. Metal salts are also included in the shell to produce the flash and colour exhibited by the combustion. These elements are then generally bound together by a binder, usually a type of carbohydrate and encapsulated within a paper or cardboard shell (Compound Interest, 2013; Sijimol & Mohan, 2014).

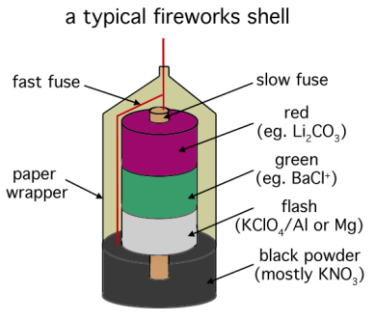

Figure 2.2 Diagram of Fireworks Components

The heat given off during the combustion reaction causes the electrons of the chosen metals to 'excite' emitting the excess energy as light. Many different types of elements or elemental compositions are used to produce the bright colours associated with fireworks. For example, lithium (Li) salts produce pink, sodium (Na) salts make yellow or orange, copper (Cu) and barium (Ba) salts generate green or blue, and calcium (Ca) or strontium (Sr) give red (Compound Interest, 2013; GrrlScientist, 2019; Chi-Chi, 2016; Cao, et al., 2017). A summary of the chemicals found in fireworks is provided in Figure 2.3, also included in Appendix 3.

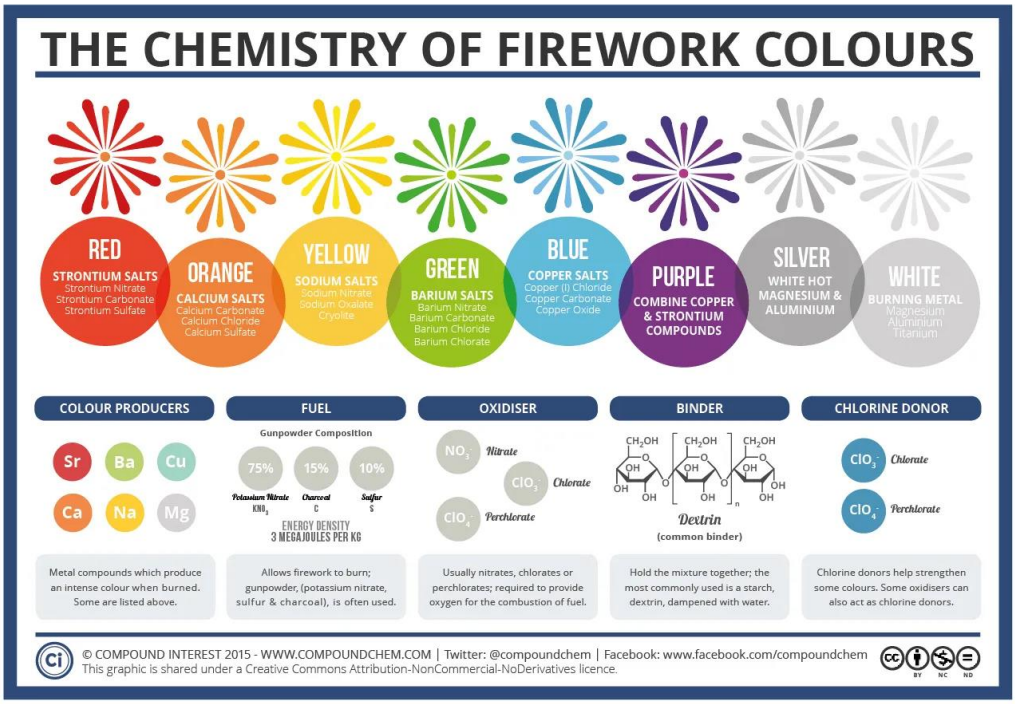

Figure 2.3 The Chemicals in Fireworks (Compound Interest, 2013)

2.3 Environmental Impact

Firework displays are high intensity activities that cause short-term air quality degradation, produce uncharacteristically loud noises, flashes of light and release toxins into the environment.

2.3.1 Chemical and Metallurgical Pollutants

Particles

Firework displays commonly generate dense smoke clouds of particulate matter (PM) that disperse water-soluble ions, trace metals and other toxins into the atmosphere (Chi-Chi, 2016; Cao, et al., 2017). For example, firework displays at major events in Oahu (US), Hisar (India) and Jinan (China) resulted in a 2 to 14-fold increase of PM2.5[1] and PM10[2] concentrations in comparison to their relative background levels. The literature suggests the impact of a firework display can result in a 5 to 20-fold increase of PM baseline levels (Croteau, Dills, Beaudreau, & Davis, 2010; Chi-Chi, 2016; Cao, et al., 2017) or by between 7 and 14% of the combusted mass of fireworks (Croteau, Dills, Beaudreau, & Davis, 2010). The amount of PM released during the display is largely tied to the volume of fireworks used in the display, with large events obviously producing more pollution.

Similarly, the literature portrays a large variance when considering the time taken for PM levels to return to pre-event levels. Chi-Chi (A review of the impact of fireworks on particulate matter in ambient air, 2016) reviewed 49 separate studies relating to atmospheric pollution resulting from firework displays, whereby the research suggested that firework PM can remain suspended in the air for a week or even up to 1 month after festival displays. Alternatively, Croteau (Emission factors and exposures from ground-level pyrotechnics, 2010) and a review by the Scottish Government (Fireworks Legislation and Impacts: International Evidence Review, 2019), observed the return of PM concentrations to background levels within a space of 24 and 16 hours respectively.

The large variance in the timeframes is linked to multiple factors. The size of the display impacts the amount of matter and therefore influences the how long the PM takes to disperse. Smaller events like Manning will disperse relatively quickly. Other factors include wind and climatic pressures, rainfall, distance away from the display and the height of the display. Croteau (Emission factors and exposures from ground-level pyrotechnics, 2010) found that ground-level displays presented larger risks for PM to impact the health of spectators than aerial displays which are further away and disperse more rapidly into the atmosphere.

Studies have shown that even brief exposure to pollutants derived from fireworks can pose a high non-carcinogenic risk to human health. Fireworks generate fine and ultrafine particles which are more toxic and appear to have a more negative health effect compared with coarse particles (Chi-Chi, 2016). Health effects are mainly expressed as a result of the inhalation of smoke derived from the display which contributes to coughs, fever and dyspnea, and even acute eosinophilic pneumonia. The impact of increased PM10 emitted from fireworks includes acute lower respiratory tract symptoms and illnesses (Cao, et al., 2017).

While no research was found discussing the impact of PM on fauna, the increase in PM is expected to have a similar effect as in humans. Sufficient evidence has also been demonstrated that water-soluble ions contribute to more than 50% of PM2.5 mass (Chi-Chi, 2016), which thereby enables the contaminants to enter the ground and waterways more easily.

In summary, firework displays are considered to increase particulate matter concentrations of 5 to 20 times background concentrations and remain in the atmosphere from between 16 hours and a month. Increased concentrations of particulate matter may cause respiratory difficulties even after only short durations of exposure. Despite the literature focusing on human health impacts. similar impacts are considered likely for fauna. The scale of these impacts is linked to the volume of fireworks and duration of the display. It is likely Manning Park is at the lower end of the spectrum.

Oxidising Agents

Oxidising agents such as perchlorate are included in fireworks as atmospheric oxygen does not support rapid combustion (Chi-Chi, 2016). Perchlorate is an oxy-anion of chlorine. During the production of fireworks and firework displays, the potential exists for perchlorate to be released into the air, and then deposited onto the

[1] Particle Matter less than 2.5µm in size, generally associated with harm to health.
[2] Particle Matter less than 10µm in size, generally associated with harm to environment.

land or water along with precipitation. Perchlorate is readily water-soluble and remains stable for long periods of time under natural environmental conditions. Perchlorate collected in the soil may either leach into water bodies or may be absorbed by plants through soil moisture and accumulate in plant tissues. Multiple studies have detected perchlorate in groundwater, surface water and drinking water following firework displays (Sijimol & Mohan, 2014; Scottish Government, 2019).

Perchlorate is hazardous to many organisms as it is a potent thyroid disruptor. Perchlorate actively inhibits the uptake of iodide by the thyroid gland thereby resulting in the decreased production of thyroid hormones (Sijimol & Mohan, 2014; Chi-Chi, 2016). Perchlorate is therefore particularly hazardous to aquatic organisms who consume contaminated water and animals whose diet consists of aquatic organisms such as waterbirds and some mammals.

The oxidising agent comprises approximately 40% of each firework and therefore remaining residue has the potential to contaminate soil and water over a large area. Sijimol and Mohan (Environmental impacts of perchlorate with special reference to fireworks—a review, 2014) reported groundwater being contaminated within a radius of 100m of the firework display while noting the extent of contamination depends on the number of displays, types of fireworks involved, amount of misfiring, firework disposal, and the duration of the display.

Several studies have been conducted throughout America suggesting various impact levels from perchlorate. Studies in Dartmouth and Oklahoma reported elevated levels of perchlorate in soils, groundwater and the surface water of a small lake (New Hampshire Department of Environmental Services, 2018). Separate studies suggest elevated concentrations in surface water appeared to peak approximately 14 hours following firework displays (reaching levels from 24 to 1028 times the mean baseline value); and then returned to background levels within 20 to 80 days (GrrlScientist, 2019). Research suggests perchlorate concentration above 2µg/L are required to have an impact on water quality (New Hampshire Department of Environmental Services, 2018).

Nitrate is also known to be used in fireworks as an oxidising agent. While no studies were found linking the impacts of nitrate residue from fireworks to environment harm, nitrate is known to be potentially toxic to freshwater aquatic organisms in high concentrations, although some marine animals are also sensitive. The main toxic action of nitrate is due to the conversion of oxygen-carrying pigments to forms that are incapable of carrying oxygen (Camargo, Alonso, & Salamanca, 2005).

In summary, the oxidising agents used in fireworks can contaminate soil, groundwater, and surface water within a reasonable radius of the display. Oxidising agents such as perchlorate are readily water-soluble and return to the ground through precipitation thereby impacting the quality of soil, groundwater and surface water and the health of organisms through uptake. Perchlorate concentrations have been found to decrease over time following firework displays, however the impact of accumulation has not been studied. Areas in which firework displays happen regularly are expected to show a gradual increase of perchlorate levels over time as the gradual increase in perchlorate concentration is likely to make dilution less effective.

Metals

A variety of different metals are used to influence the burst of light displayed by fireworks as discussed in Section 2.2. It is therefore no surprise that studies from around the world have all reported an increase of metals concentrations in the air following firework displays (Croteau, Dills, Beaudreau, & Davis, 2010; Chi-Chi, 2016; Kumar, et al., 2016; Cao, et al., 2017; GrrlScientist, 2019). Chi-Chi (A review of the impact of fireworks on particulate matter in ambient air, 2016) observed from 49 separate firework displays, 25 reported increased concentrations of Al, Ba, Cd, Cr, Cu, K, Mg, Mn, Pb, Sr and Zn[3].

[3] Aluminium (Al), Barium (Ba), Cadmium (Cd), Chromium (Cr), Copper (Cu), Potassium (K), Magnesium (Mg), Manganese (Mn), Lead (Pb), Strontium (Sr) and Zinc (Zn)

The 2006 FIFA World Cup firework display in Milan resulted in increased concentration of metals in the air, which included Sr (120-fold), Mg (22-fold), K (12-fold), Ba (11-fold), and Cu (6-fold) (Chi-Chi, 2016). Similarly, Kumar (Fireworks induced particle pollution: A spatio-temporal analysis, 2016) observed across a number of displays an average increase from background levels of Ba (24.7 times), Sr (2.98 times) and Cu (3.18 times). Furthermore, a 2016 study from Spain reported an increase in air metal concentrations not only at the firework launch site but also nearby in places throughout the city as the smoke clouds dispersed. Air metal concentrations were elevated for days following the display (GrrlScientist, 2019), however it has typically been reported air metal concentrations declined within 24-hours (New Hampshire Department of Environmental Services, 2018). ISPL notes however, these fireworks displays were of a more significant size and duration than those at Manning Park..

Metal particles, such as Cd, Pb, Cr and Ni have been identified as human carcinogens and also have severe effects on people with asthma (Cao, et al., 2017). In addition to the health related impacts of metals, many of the particles from the air end up deposited on the land or in surface water thereby having the potential to damage vegetation and impact on the health of other organisms (Cao, et al., 2017). A number of the metals identified as being used in fireworks are substances or wastes which if released may present immediate or delayed adverse impacts to the environment by means of bioaccumulation and/or toxic effects upon biotic systems (Ascend Waste and Environment, 2015). For example, Flying Colours Fireworks (Environmental Impacts, 2020) notes elevated levels of:

- Sr has been linked with harm to bone marrow and blood thinning;
- Al has been linked with poor mental and physical performance;
- Cu can be extremely harmful to aquatic ecosystems and has also been liked with firework caused dioxin pollution;
- Ba has been linked with retching, loose bowels, breathing inconvenience, changes in pulse, general muscle shortcoming and spasms; and
- Cd can be linked to cancer, lung harm, kidney infection and delicate bones.

In summary, many different types of metals are included in fireworks to create colourful displays. The combustion of fireworks release metals into the atmosphere resulting in elevated metal concentrations for up to several days which only decrease due to dissipation. Metals released from fireworks may be deposited in soils or waterbodies or breathed in by humans or fauna. Many of the metals used in fireworks have carcinogenic or toxic impacts on humans, flora and fauna. The level of impacts will depend on the size and duration of the display.

Other Pollutants

The combustion of fireworks produces several by-products which can also be harmful to human health and the environment. Following firework displays, increases in SO_2, NO, NO_2, ozone, and organic compounds are generally observed (Croteau, Dills, Beaudreau, & Davis, 2010; Cao, et al., 2017). SO_2 can be slowly absorbed into fine particles and transported deeply into the lungs, thereby causing long-term health effects. NO_2 emitted from fireworks can generate biochemical alterations and histological demonstrable lung damage leading to both acute and chronic exposure. The higher concentrations of O_3 and CO also may cause severe asthma and lung diseases (such as pneumonia) (Cao, et al., 2017).

2.3.2 Material/ Physical Waste Impacts

Fireworks consist of several parts which are not all consumed during combustion. Croteau (Emission factors and exposures from ground-level pyrotechnics, 2010) reviewed a number of different fireworks and concluded on average between 55% and 86% of the original mass of the firework remained as non-combusted residue and packaging. In addition to this, tubing and wires are also used during fireworks displays and therefore have the potential to be left behind as waste. Fireworks are often ignited over water in order to reduce the risk of fire; however, in doing so increases the likelihood wastes will end up in the water. The paper or cardboard

packaging is unlikely to be entirely consumed during the explosion and therefore will return to the ground. Weather conditions play a large role as to where the waste will likely land and how easy it will be to contain and collect. The level of impacts will depend on the size and duration of the display.

2.3.3 Fire

The combustion of fireworks produces a number of 'excited particles', immense heat and falling debris, and this can result in fire. As fireworks are legal to purchase for personal use in North America, there are numerous records of fires started from fireworks. For example, between 2009 and 2013 fireworks were the reported cause for 129 fires and almost $2.5 million in damage (The Land Between, 2019) in Ontario, Canada. In 2018 across the US it is estimated that fireworks started 19,500 fires in the calendar year (National Fire Protection Association, 2020).

While fireworks are generally not available for private sale in Australia, public firework displays still present a risk of fire, particularly in Australia's dry climate. Following the devastating bushfires of 2019, public opinion against firework displays commenced in Australia with multiple petitions circulating to ban displays such as the New Year's Eve Sky Show in Sydney (BBC News, 2019). While the events are heavily regulated and measures are put in place to limit the risk and impact of fires, the potential for fires still remains; and following the catastrophic outcome of bushfires in recent years, the issue remains sensitive to the general public.

2.3.4 Noise Pollution

A number of noise studies have been conducted on firework displays. Of the seven studies reviewed by Cao (Review on physiochemical properties of pollutants released from fireworks: Environmental and health effects and prevention, 2017) that focused on noise quality, the mean noise level during firework displays was found to be approximately 90dB; 1.2 times higher than mean background noise levels of 78dB. Further research has estimated peak noise levels to be between 137dB and 190dB, which is high enough to be harmful to human hearing and can lead to life-threatening injuries to pets, livestock, wildlife and birds due to the impulsive nature of the noise (Scottish Government, 2019; RSPCA, 2019; GrrlScientist, 2019).

While there is limited information available specific to Australia and more specifically its native animals, there is consensus amongst the research that fireworks can be a source of fear and distress for many animals (RSPCA, 2019). The hearing of many animals is much more sensitive than that of humans and so not only are fireworks found to be more disturbing for them, but they can also damage their hearing more severely (Animal Ethics, 2019; Scottish Government, 2019). Furthermore, the infrequency and unpredictability of fireworks makes it unlikely that animals will acclimatise to the noise produced regardless of how often events are held (RSPCA, 2019).

Native Fauna

Most of the research conducted on the impact of noise focuses on dogs, farm animals and birds, with the effects of sudden loud noises on native or wild animals being difficult to assess. How native fauna react to noise stimuli largely depends on the biology and behavioural traits of each species, as well as nutrition, intraspecific conflicts and reproductive status (Rodewald, GansloBer, & Kolpin, 2014). Psychological effects on native fauna are difficult to assess and for this reason most of the research makes assumptions based on behaviours exhibited in response to loud noise (RSPCA, 2019).

The evidence suggests many small mammals are likely to run, hide, shiver, cower or freeze in response to loud and sudden noises (Scottish Government, 2019). Other studies have reported rodents continue displaying stressed behaviours such as running for several minutes after the noise ceases (Animal Ethics, 2019). Research is also available to suggest the noise from fireworks affects larger mammals such as sea lions who were observed becoming vocal and then fleeing (Pedreros, Sepulveda, Gutierrez, Carrasco, & Quinones, 2016) and rhinoceroses and cheetahs who exhibited distinct signs of arousal or panic (Rodewald, GansloBer, & Kolpin, 2014). Despite these observations, monitoring of quokka populations on Rottnest Island during firework

displays did not indicate any distress or changes in behaviour (Scott, 2018). This response, as suggested by the literature, is likely influenced by the quokka's surroundings, behaviour and social adaptations.

Loud noises have historically been used as a deterrent for birds and so it unsurprising the effect fireworks have on birds. The available research agrees birds commonly take flight as a result of loud noises with numerous studies suggesting multiple species fly upwards several hundred metres to escape the area, unlikely to return for at least 45 minutes following the end of the display (Griffin, 2012; Scottish Government, 2019; RSPCA, 2019; Evans-Brown, 2019). While the noise of fireworks can cause tachycardia in birds or even death from fright; the most common cause of death or injury is due to blunt-force trauma from birds becoming disorientated and crashing into trees, buildings or other objects (Griffin, 2012; Scottish Government, 2019; Animal Ethics, 2019; McCammon & Paris, 2019).

Several studies have also reported birds (such as nesting terns and gulls) abandon their nests either temporarily or permanently as a result of the noise (Animal Ethics, 2019; RSPCA, 2019). This reaction, commonly exhibited by seabirds, resulted in cancellation of the 4th of July firework displays in Gualala, California (Griffin, 2012).

Many organisations such as veterinary clinics and the RSPCA group the impacts of and care advise given regarding fireworks and thunderstorms, given the several similarities such as sudden noise, flashes of light and generally short durations. The fearful and anxious behaviour exhibited by animals in response to thunderstorms is considered appropriate as it is a survival response to potential danger (PennVet, 2020). A key difference between the two is that storms generally provide some sort of warning to animals by gradual change in weather conditions such as increasing wind, darkening skies and a drop in barometric pressure (PennVet, 2020). Despite this, the cowering or fleeing response exhibited by most animals is still displayed. It is therefore also suitable to acknowledge the similarities in the return of normal behaviour following the removal of stimuli, be it storm or fireworks, and the animal's ability to recover or withstand the event.

In 2001, the City of Cockburn commissioned an impact assessment on the effects of firework displays on the waterbirds in the Manning Park area. The study found the fireworks did not adversely affect the waterbirds of Manning Lake. (City of Cockburn, 2001)

Livestock

Horses and farm livestock are easily frightened by loud noises and generally respond in ways that result in injury to themselves or damage property or equipment. A study revealed that noises ranging from 80dB to 89dB increased the heart rate of pigs; while prolonged exposure to noise levels above 100dB increased the respiration rate in lambs (RSPCA, 2019). Several studies have been undertaken to examine the impact of fireworks on horses who exhibit a flight response when exposed to loud noises. In a study conducted by Gronqvist (The Management of Horses during Fireworks in New Zealand, 2016) of nearly 5,000 horses, 79% were shown to react anxiously or very anxiously as result of fireworks, with 82% of the horses starting to run; and more than a quarter of those received injuries as a result. A similar study was conducted on chickens, however only 9.3% of the chickens observed were visibly frightened (Scottish Government, 2019).

Domestic Animals

Sensitivity to loud, infrequent noises is particularly common in dogs and is usually following by anxious behaviour. Despite much of the research being conducted on dogs, there is evidence suggesting cats and other small mammals such as rabbits, ferrets and guinea pigs exhibit similar responses (Scottish Government, 2019). The most common stress responses exhibited by domestic animals include vomiting, severe self-injury and accidental trauma. In a survey conducted by Gates (Owner perceptions and management of the adverse behavioural effects of fireworks on companion animals: an update, 2019) which included 4,293 pet owners

(15,871 pets), 74.4% of the animals were reportedly frightened by fireworks exhibiting behaviours such as hiding, shivering and cowering, and 345 were injured as a result of the fireworks.

In summary, fireworks have been recorded reaching noise levels up to 190dB and averaging 90dB for the duration of the display. Noise levels this high can damage human hearing and cause a behavioural reaction in animals. While in most cases, animals exhibit shivering or cowering (mainly stationary responses), some species exhibit flight responses which can lead to injury and death in extreme cases through blunt-force trauma. Birds, (primarily seabirds) have been observed abandoning their nests and, in some cases, not returning following the completion of the display.

Despite the responses exhibited by fauna in the literature from general noise, there is also research which qualifies the impact of fireworks on animals. While it is understood the loud noises affect animals' behaviours differently, there is evidence that suggests short-term events and changes like fireworks do not induce real stress as long as the animals are able to cope with them (Rodewald, GansloBer, & Kolpin, 2014). Chronic stress, which is responsible for the serious behavioural and physiological consequences is unlikely to be caused by short-term events. Observations show animals tend to manage the impact of stress with retreat behaviours enabling them to tolerate the fireworks display (Rodewald, GansloBer, & Kolpin, 2014). Furthermore, given the frequency, duration, and intensity of sounds resulting from fireworks displays, it is unlikely that wildlife would sustain temporary, much less permanent, hearing damage (Environmental Analysis Section Stewardship Branch, 2008). This is particularly relevant given the small scale display at Manning and it is unlikely that hearing damage would be sustained by the local wildlife.

2.3.5 Light Pollution

Far less research has been conducted on the impact of light generated from firework displays than what has been carried out for sound. Nevertheless, the light produced from fireworks represents a human-caused disturbance stimulus that, depending on the time of year, exposure time and proximity, can have varying disturbance effects. Research concludes birds react to visual stimuli just as readily as acoustic stimuli. In Stickroth's (Effects of Fireworks on Birds - A Critical Overview, 2019) study, despite the birds only exhibiting a mild reaction, even at a distance where the noise could not be heard, birds took flight in response to the light produced. Further research also indicated waterbirds may react more sensitively to light than other birds and mammals (Stickroth, 2019).

There are also other studies assessing the impact of artificial light on the natural environment. Light influences a variety of the physiological and ecological processes and therefore the impact of light pollution on particular species, communities or ecosystems can be significant (Shier, Bird, & Wang, 2020). Light generated from fireworks would be expected to have minimal to no impact in these circumstances due to the short duration of exposure (in comparison to longer-term light pollutants such as streetlights).

3 Impact Assessment

The EIA was completed to assess the impacts identified through the desktop research on the known environmental and social values within the City of Cockburn, more specifically Manning Park. The EIA uses the definitions provided in Table 3.1 to assign an impact rating to attributes of the firework display. Impact ratings have been assigned based on available knowledge and therefore may differ if new information becomes available.

Table 3.1. Risk matrix

		Consequence		
		Short-term	*Medium-term*	*Long-term*
Likelihood	*Very Likely*	Medium	High	High
	Likely	Low	Medium	High
	Unlikely	Low	Low	Medium
Definitions	**Consequence:** *Short-term* - Impacts will have a short-term effect (duration of fireworks display and following 24 hours) with conditions returning to pre-event levels. *Medium-term* - Impacts will have a medium-term effect (lasting up to several months) with conditions returning to an alternative stable state. *Long-term* - Impacts will have a long-term effect (lasting 2 years or more) with conditions unlikely to return to pre-event levels. **Likelihood:** *Unlikely* – Event / impact has a rare or unlikely chance of occurring. *Likely* – Event / impact has a possible chance of occurring. *Very-likely* – Event / impact will occur. **Impact Rating:** *Low* – No or small impact(s) to the environment or community that may not require management measures. *Medium* – moderate impact(s) to the environment or community that can be reduced with management measures. *High* – significant impact(s) to the environment or community that are unlikely to be controlled with management measures.			

Table 3.2. Risk Assessment Relevant to the Manning Park Display

Value	Impact	Likelihood	Consequence	Rating	Comments
Air					
Air Quality	Smoke plume produced from the firework display contains a number of pollutants including particles, metals and by-products which reduce the air quality.	Likely	Short-term	Low	Although it is likely the firework display will produce a plume of smoke, given the size of the display it is likely it will dissipate relatively quickly and produce minimal concentrations of pollutants.
	Reduced air quality from firework pollutants causes respiratory issues for humans and animals.	Unlikely	Short-term	Low	It is likely pollutants will be produced from the fireworks, however given the proximity to the launch site and the distance from the ground it is unlikely the smoke will cause any respiratory issues prior to it dissipating.
Land					
Soil Quality	Metals produced from the firework display settle to the ground contaminating the soil.	Likely	Long-term	High	Metal particles are likely to fall to the ground following the firework display (although at low quantities given the size of the display). It is unlikely metal concentrations from a single display will have an impact on contamination levels but the impact of accumulation from multiple events is unknown. As the display is held at the same location each year, concentrations could increase over time.
	Oxidising agents such as perchlorate produced from the firework display settle to the ground contaminating the soil.	Unlikely	Medium-term	Low	It is unknown what oxidising agent is contained in the fireworks utilised in the display. Perchlorate is readily water-soluble and so if used would be expected to dissipate resulting in a decrease in soil concentration levels over time. As the size of the display is small, high concentrations of oxidising agents would not be expected.
Aesthetic	Litter resulting from the fireworks display is unappealing.	Very-likely	Short-term	Low	Litter is likely however it is collected following the event.

Value	Impact	Likelihood	Consequence	Rating	Comments
Water					
Water Quality	Metals produced from the firework display fall into the water, leach from the soil or leach/ dissolve from waste (packaging) residue.	Likely	Long-term	High	As the firework display takes place above the lake it is assumed metal particles will fall into the water. It is also possible for metals to leach or dissolve from material waste residue which falls into the water. It is unlikely metal concentrations from a single display will have an impact on contamination levels, but the cumulative impact of ongoing events is unknown. As the display is held at the same location each year, concentrations could increase over time.
	Oxidising agents such as perchlorate produced from the firework display fall into the water, leach from the soil or leach/ dissolve from waste (packaging) residue.	Likely	Long-term	High	It is unknown what oxidising agent is included in the fireworks utilised in the display. Perchlorate is readily water-soluble and has the potential to contaminate the lake and groundwater if used. As the size of the display is small, high concentrations of oxidising agents would not be expected, however can be hazardous in aquatic environments.
Fauna					
Native Fauna	Light from the firework display causes birds to react and potentially injure themselves.	Likely	Short-term	Low	Research suggests birds, particularly water birds may react to bursts of light.
	Noise produced from the firework display causes birds to react and potentially injure themselves.	Likely	Medium-term	Medium	Research suggests birds are likely to react in some way as a result of sudden loud noises. Behaviour may differ between individuals, either remaining stationary or taking flight. When taking flight, it possible for birds to become disorientated, injure themselves or abandon nests.
	Noise produced from the firework display causes small mammals to react and potentially injure themselves.	Likely	Short-term	Low	Research suggests although loud bangs may cause anxious behaviour, it is likely to only be short-term and result in mainly stationary actions thereby reducing the chances of injury.

Value	Impact	Likelihood	Consequence	Rating	Comments
	Noise from the fireworks display causes animals to abandon the area and not return.	Unlikely	Long-term	Medium	Research suggests fleeing or abandonment is a possible reaction to loud noises, however in most cases observed, individuals return when the disruptions cease. This is seen to be the case at Manning Based on the 2001 study on waterbirds.
	Native fauna ingests or become tangled/ trapped in remaining litter.	Likely	Short-term	Low	Litter resulting from the firework display is most likely to consist of paper and cardboard from the packaging. The City of Cockburn have stated the fireworks do not use any plastic and therefore the risk of entrapment or issues caused by ingestion are reduced.
	Metals or oxidising agents ingested resulting in illness or death of aquatic fauna, waterbirds or other animals higher in the food chain.	Unlikely	Long-term	Medium	The concentrations of metals or oxidising agents produced from the size of the fireworks display is unlikely sufficient to cause harm. It is however unknown what oxidising agent is used and the impact of accumulation or bioaccumulation.
	Loss of habitat as a result of fire.	Unlikely	Medium-term	Low	Fire is an inherent risk however, provided appropriate measures are put in place, the likelihood is reduced and impact minimal.
Livestock	Noise produced from the firework display causes horses or other farm animals to react thereby causing injury.	Likely	Short-term	Low	Research suggests horses are likely to react to loud bangs, however the location of the firework display makes it less likely any horses will be within hearing distance. Behavioural changes are considered to be short-term and cease with the firework display.
Domestic pets	Noise produced from the firework display causes behavioural change in domestic animals.	Very-likely	Short-term	Medium	Research suggests domestic animals are likely to react to loud noises with the potential for harming themselves. Given the firework display takes place in a predominantly residential area it is very likely domestic animals will be within hearing distance.

Value	Impact	Likelihood	Consequence	Rating	Comments
Flora					
Vegetation health	Uptake of contamination from soil or water as a result of firework debris or residue reduces vegetation health over time.	Unlikely	Long-term	Medium	The level of contamination resulting from a small firework display is unlikely to be significant enough to impact on vegetation health. However, it is unknown what oxidising agent is used and the impact of accumulation.
Vegetation density	Fire caused by the firework display could result in a reduction in vegetation density.	Unlikely	Medium-term	Low	Fire is a risk associated with fireworks, however provided appropriate measures are put in place, the likelihood is reduced and impact minimal.

3.1 Discussion of Impacts

3.1.1 Air

Fireworks produce pollutants from the combustion reaction and left-over residues. These pollutants, including particulates, metals and other inorganics and organic by-products will be present in the form of smoke trails. As the firework display at the City of Cockburn Rotary Spring Fair occurs for only a short duration (approximately 10 minutes) and takes place outdoors with the majority of the fireworks combusting at heights greater than 75m above ground level; it is considered likely the smoke will dissipate prior to reaching a level in which humans or fauna are likely to breath the pollution in.

Pollution concentrations are unlikely to impact the overall air quality of the City of Cockburn due to the size and duration of the firework display. Although particulate matter concentrations are likely to increase slightly in the short-term; given location of the display and occurrence of coastal breezes, dilution of pollutants are expected to happen relatively quickly. As the research suggests, pollutant levels would be expected to subside within a day, if not sooner.

3.1.2 Land and Water

The quality of the soil and water has the potential to be impacted as a result of contaminants produced from the firework display. Particulates, metals, and oxidising agents remaining after combustion are likely to be deposited on either land or water. While the size of each firework display makes it unlikely to have a significant impact on the quality of the water or soil in Manning Park on their own, it is unknown if there has been an accumulative effect resulting from the display in the same location year after year.

The research suggests that in most cases the oxidising agents commonly used in fireworks are readily water-soluble and can be hazardous to aquatic ecosystems. It is unknown which oxidising agent is used in the City of Cockburn's fireworks therefore, the worst-case scenario (use of perchlorate) has been assumed for the impact assessment and the risk rating is therefore the highest. Metal particulates are also likely to be deposited in either the water or soil; and research describes metals such as copper are hazardous to aquatic ecosystems, while a number of the other elements can result in health impacts if sufficient quantities are consumed or absorbed.

Firework packaging is also likely to be found following the display. The packaging used for the City of Cockburn's fireworks consists of 100% biodegradable cardboard. While this will breakdown over time, if not collected following the event, it may form a choking hazard for fauna in the area and may contain left-over residue not consumed during combustion. This residue may consist of gun powder, metals, or oxidising agents, all of which can be hazardous if consumed or will continue to release into the environment through oxidation and exposure to rain. It is important to note the contractor used by the City of Cockburn is responsible for the collection and recycling of remaining cardboard tubes and packaging, and also reuses equipment from the display such as copper wiring and fibreglass canisters where possible.

3.1.3 Fauna

Native fauna, livestock and domestic pets have been considered during the impact assessment. Native fauna was identified to be at most risk due to their proximity to the fireworks display and the potential for their environment to be contaminated by chemicals remaining from the fireworks or litter. The noise generated from the firework display is identified as the highest risk to fauna, but according to research, is unlikely to result in any long-term impacts. It is also important to note the City of Cockburn have not received any reports of injured wildlife in response to the firework display.

Small mammals are likely to cower from loud noises, making the risk of injury less likely. Domestic pets, while likely to exhibit anxious behaviour, can be secured by pet owners and are likely only to show a change of behaviour during the display. Horses and livestock are more at risk than other mammals due to their flight

response leading to possible injury. Based on the location of the City of Cockburn Rotary Spring Fair, it is less likely livestock and horses will be within a close proximity to the display and therefore less likely to react to the noise. Birds as a group are identified as at most risk, although behavioural changes are expected to vary between species. Various species will either take flight or cower in response to the loud noise. When taking flight, individuals may be prone to injury due to collision with objects or disorientation. As Manning Park is morphologically quite open, there are less obstacles for birds to collide with should they take flight rapidly. The research suggests noise attributed to the fireworks display is unlikely to result in long-term nest or area abandonment. The short-term impacts from fireworks are not expected to cause chronic stress and all behaviours are expected to return to normal shortly following the end of the fireworks.

Based on the available information, it is unclear what impact contaminants will have on the habitat or health of the fauna. While many chemicals used in fireworks are considered hazardous when ingested, the concentrations resulting from a small annual display are not expected to be sufficient to result in serious impact. The likelihood of pollutants accumulating from the annual display is unknown, this has the potential to result in higher concentrations of contaminants and therefore there is potential for impacts to the health of fauna and their habitat.

3.1.4 Flora

Impacts to vegetation are unlikely to result from the firework display. While fire remains a risk, the City of Cockburn implements appropriate measures to reduce the risk and impact including employing professional fire tenders to be onsite for the event.

There is the potential for vegetation health to be impacted from contaminant uptake, although this is unlikely given the small scale. As discussed in previous sections the firework display is not expected to be capable of generating sufficient levels of contaminants to result in an impact to ecosystem health or water and soil quality. The potential for contaminants to accumulate over the years is unknown and therefore difficult to assess.

4 Conclusion and Recommendations

The impact assessment has been undertaken using available resources to identify potential impacts from firework displays. The literature largely focuses on impacts associated with much larger displays which include a greater quantity of fireworks, are longer in duration and are more frequent. ISPL has used the literature and contextual information pertaining to the local environment and information provided by the City of Cockburn regarding the Rotary Spring Fair firework display to determine and assess potential impacts.

The research suggests fireworks have the potential to cause plumes of pollution as a result of the combustion of fireworks. The smoke generated contains traces of particulate matter, metals, non-combusted residues such as oxidising agents and inorganic by-products. A number of the pollutants are known carcinogens or impact healthy respiratory functioning. Based on the size and duration of the Rotary Spring Fair firework display, the height at which most of the display takes place and the likely weather conditions, it is unlikely the fireworks display will have a medium or long-term impact on the City of Cockburn air quality, although impacts are likely to occur in the short term.

Particulates produced from the combustion of the fireworks are likely to be deposited at the location used for the display. In terms of the Manning Park this will occur over the land or the lake. While ISPL considers it unlikely the Rotary Spring Fair firework display will produce contaminants in concentrations high enough to impact the quality of the soil and water, and health of flora and fauna; there is potential for contaminants to accumulate and further work is required to determine if there are impacts.

ISPL recommends, that should the display continue at Manning Park, a monitoring program be established to quantify the potential accumulative impacts associated with contaminant build-up in soil and water. Monitoring should occur to identify any seasonal fluctuations in water and soil but also immediately preceding and following a fireworks display. This information can be used to assist in any future decisions relating to the continued use of fireworks or moving firework displays to other locations within the City of Cockburn which may not have as sensitive environmental receptors. This will provide quantifiable data which can be compared to the following guidelines:

- ANZECC & ARMCANZ Freshwater Quality Guidelines (2018);
- NEPM Schedule B1 Groundwater Investigation Levels (GILs) (2011); and
- NEPM Schedule B1 Health Investigation Levels (HIL) for Soil Contaminants (2011).

Little evidence was presented in the literature pertaining to the impact of light produced from firework displays. The research suggests bursts of light can cause a flight reaction in birds similar to that produced by noise stimuli. While it is known that loud noises result in a fear response for most animals; single, short-duration events such as fireworks are considered unlikely to result in chronic stress, which could result in a significant behavioural and physiological response and impacts (Rodewald, GansloBer, & Kolpin, 2014).

Other than immediate responses such as flight, running or cowering, medium or long-term impacts are unlikely. The greatest risk perceived to fauna is that caused by blunt-force trauma caused by animals trying to flee the area. This risk is applicable to all animals and can be managed to mitigate and reduce the risks to fauna, ISPL recommends:

- Continuing to advertising the date, time and duration of the firework display using multiple platforms and media well in advance of the event to allow pet owners time to appropriately prepare;
- Encouraging pet owners to seek advice from professionals if they know their pet gets anxious and responds badly to fireworks;
- Encouraging pet owners to keep their pets inside during the fireworks display;
- Install temporary signage around Manning Park to reminding people to watch for animals crossing and to reduce speeds, or additional signage placed out for the event along internal roads which people may use to leave the park following the event and

- Continue to monitor Manning Park and surrounding areas following the fireworks display to determine whether any native animals have injured themselves trying to flee the area.

Packaging from the fireworks is expected to be littered about Manning Park following the display. Correspondence with the City of Cockburn indicates efforts are taken to ensure litter is collected following the display. Despite this, the 2001 Spring Fair Fireworks Bird Impact Study by the City of Cockburn acknowledges litter was still present in the lake and surrounding vegetation several days after the event (City of Cockburn, 2001). Since this report the City has made it the responsibility of the contractor to use biodegradable packaging, collect and recycle remaining cardboard tubes and packaging and reuse equipment where possible. The site is also inspected following the event to collect any additional litter. ISPL recommends formalising the clean-up and establishing clean-up standards. It is acknowledged the general public's attendance at the fair is also contributing litter (in addition to that generated by the firework display); and both pose a risk to the environment and require management.

The risk of fire was the final impact considered for the City of Cockburn firework display and based on the information available, appears to be appropriately managed - no changes are recommended.

In conclusion, from the impacts identified, it is not currently possible to definitively state whether the City of Cockburn Rotary Spring Fair fireworks display should or should not continue. The only long-term impacts identified by this assessment relate to the potential accumulation of contaminants over time from multiple events however this rating could be significantly reduced by ascertaining the actual contaminants within the proprietary chemical constituents of the fireworks and their concentrations likely to be produced by the firework display. Despite allocating the highest rating to these impacts, this is more likely due to knowledge gaps rather than actual risk. Therefore, the impacts attributed to the fireworks display do not necessarily provide sufficient reasoning to cancel the display in future years.

ISPL recommends that in the long term, consideration be given to relocating the display to a location that does not contain or is not adjacent to a wetlands or natural bushland such as a sporting oval. The relocation would lessen impacts to native fauna, water pollution and reduce firs risks. It is acknowledged that depending on the site selected there could be an increase in impacts on domestic animals due if the proximity to residences in reduce. ISPL believes these impacts can be minimised with continued adequate warning given to local residents.

Should the display continue at Manning Park a monitoring program is required to quantify the potential accumulative impacts associated with contaminant build-up in soil and water. Monitoring should occur to identify any seasonal fluctuations in water and soil but also immediately preceding and following a fireworks display. This information can be used to assist in any future decisions relating to the continued use of fireworks or moving firework displays to other locations within the City of Cockburn which may not have as sensitive environmental receptors.

Monitoring post-firework displays should also occur to ensure no injury to native fauna or where native fauna are injured that they receive appropriate care; as well as implementation of management plans to ensure all waste is collected and removed from Manning Park following the event. Should monitoring of native fauna and waste identify changes to baseline conditions at Manning Park which are attributed to the annual fireworks display, further consideration should be given to the continued use of fireworks at this location.

Although many locals enjoy the fireworks at Manning it is prudent to note that the public perception of fireworks is changing, and more people are becoming concerned about the impact on animals and the appropriateness of the displays given the increasing devastation caused by bushfires. ISPL suggests the City of Cockburn investigate and trial alternatives, where possible and financially feasible to do so, in the coming years with a goal to potentially phase out the use of fireworks in the future, should this align with public opinion.

4.1 Alternatives to Firework Displays

As part of the impact assessment, ISPL identified a number of alternative options to fireworks that could be implemented at the event. We highlight that no impact assessment has been conducted on these alternatives, nor has ISPL taken into consideration the cost or feasibility of the alternatives presented.

Silent Fireworks

Silent fireworks are becoming more common internationally to make displays more enjoyable for children, animals and people suffering with post-traumatic stress disorder (PTSD). A number of petitions were created to require noiseless fireworks to be used in NSW, however there is no evidence as to the success of the petitions. ISPL is aware that noiseless fireworks are being used as part of the ground firework display, and recommends that effort could be made to increase the number of noiseless fireworks used at the event if it is feasible.

Light Shows and Projections

Light shows or laser shows are becoming more and more popular for both indoor and outdoor events, and their rising popularity also means there are a number of companies now producing them. Lights can be used to illuminate buildings or the night sky and can be integrated with music to increase the effect. Some events have even progressed from laser light displays to projections of imagery or video being broadcast onto landmarks to create vivid displays. These events can be expensive and The City has indicated they regularly seek quotes but at this time the costs for such displays are considerable in comparison to what is currently being spent on the current fireworks.

Water Shows

Special effects utilising water are also becoming more common. Water shows often include lights and soundtracks integrated with water effects to produce a visual display. Again, these can be expensive especially when compared to the current expenditure on fireworks at Manning.

Drone Shows

As drones become more common and more available, a number of companies have become established within Australia specialising in the use of drones to produce light shows and other visual effects. Drones have the added benefit of being less invasive than other displays. Again, these can be expensive especially when compared to the current expenditure on fireworks at Manning.

Musical Acts or Performances

While firework displays are considered a premier form of entertainment at many events across Australia, the devasting impact of bushfires over the last several years has resulted in a loss of public support for the practice. A number of events around the country no longer incorporate firework displays instead including musical acts or performances, live entertainment or interactive displays.

4.2 Recommended Actions

In summary, the recommended actions presented in this impact assessment are:

- In the longer term consider relocating the fireworks display to an area without an adjacent wetland area or natural bushland such as a sporting oval;
- Keep ground level displays as far from spectators as possible and downwind if practical;
- Obtain a list of likely contaminants including the oxidising agent, potential metal particulates and any other potentially harmful products from the firework supplier;
- If the fireworks are to continue at Manning Park, undertake analysis of the soil at the launch site and water from Manning Lake prior to and immediately following the fireworks display for likely contaminants to quantify the impact of pollutants and consider establishing a long-term monitoring program;
- Monitor the Manning Park area following the fireworks display to identify any injured wildlife;

- Increase the number of silent fireworks used in future events;
- Continue to alert pet owners well in advance of the event of the time and duration of the display and provide information for managing pet behaviour during the event; and
- Continue to ensure all waste is collected and appropriately disposed of following the event.

It is to be noted that the costs of alternatives may be considerable, and the City of Cockburn will need to consider the costs of alternatives while assessing the feasibility of implementing changes.

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Appendix 1 – NatureMap and EPBC Protected Matters Report

NatureMap
Mapping Western Australia's biodiversity

NatureMap Species Report

Created By Guest user on 10/11/2020

Current Names Only Yes
Core Datasets Only Yes
Method 'By Rectangle'
Extent 115° 45' 19" E, 115° 55' 11" E, 32° 12' 32" S, 32° 03' 59" S
Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	1524	51181
Other specially protected fauna	1	23
Priority 1	3	10
Priority 2	3	12
Priority 3	21	329
Priority 4	17	703
Protected under international agreement	27	924
Rare or likely to become extinct	24	1478
TOTAL	**1620**	**54660**

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
Rare or likely to become extinct					
1.	24345	*Botaurus poiciloptilus (Australasian Bittern)*		T	
2.	1596	*Caladenia huegelii (Grand Spider Orchid)*		T	
3.	24784	*Calidris ferruginea (Curlew Sandpiper)*		T	
4.	24790	*Calidris tenuirostris (Great Knot)*		T	
5.	24731	*Calyptorhynchus banksii subsp. naso (Forest Red-tailed Black Cockatoo)*		T	
6.	24733	*Calyptorhynchus baudinii (Baudin's Cockatoo, White-tailed Long-billed Black Cockatoo)*		T	
7.	24734	*Calyptorhynchus latirostris (Carnaby's Cockatoo, White-tailed Short-billed Black Cockatoo)*		T	
8.	48400	*Calyptorhynchus sp. (white-tailed black cockatoo)*		T	
9.	34031	*Carcharodon carcharias (Great White Shark)*		T	
10.	25335	*Caretta caretta (Loggerhead Turtle)*		T	
11.	24092	*Dasyurus geoffroii (Chuditch, Western Quoll)*		T	
12.	25346	*Dermochelys coriacea (Leatherback Turtle)*		T	
13.	30836	*Diomedea exulans subsp. exulans (Snowy Albatross)*		T	
14.	10796	*Diuris drummondii (Tall Donkey Orchid)*		T	
15.	12938	*Diuris micrantha*		T	
16.	1637	*Diuris purdiei (Purdie's Donkey Orchid)*		T	
17.	1639	*Drakaea elastica (Glossy-leaved Hammer Orchid)*		T	
18.	13635	*Drakaea micrantha*		T	
19.	17150	*Eremophila glabra subsp. chlorella*		T	
20.	24146	*Myrmecobius fasciatus (Numbat, Walpurti)*		T	
21.	48237	*Rostratula australis (Australian Painted Snipe)*		T	
22.	24145	*Setonix brachyurus (Quokka)*		T	
23.	18590	*Synaphea sp. Fairbridge Farm (D. Papenfus 696)*		T	
24.	34113	*Westralunio carteri (Carter's Freshwater Mussel)*		T	
Protected under international agreement					
25.	41323	*Actitis hypoleucos (Common Sandpiper)*		IA	
26.	25554	*Apus pacificus (Fork-tailed Swift, Pacific Swift)*		IA	
27.	25736	*Arenaria interpres (Ruddy Turnstone)*		IA	
28.	24779	*Calidris acuminata (Sharp-tailed Sandpiper)*		IA	
29.	24780	*Calidris alba (Sanderling)*		IA	
30.	25738	*Calidris canutus (Red Knot, knot)*		IA	
31.	24786	*Calidris melanotos (Pectoral Sandpiper)*		IA	
32.	24788	*Calidris ruficollis (Red-necked Stint)*		IA	
33.	24789	*Calidris subminuta (Long-toed Stint)*		IA	
34.	25574	*Charadrius dubius (Little Ringed Plover)*		IA	
35.	41332	*Chlidonias leucopterus (White-winged Black Tern, white-winged tern)*		IA	
36.	24791	*Gallinago hardwickii (Latham's Snipe, Japanese snipe)*		IA	
37.	47954	*Gelochelidon nilotica (Gull-billed Tern)*		IA	
38.	48587	*Hydroprogne caspia (Caspian Tern)*		IA	

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
				IA	
39.	25741	*Limosa limosa (Black-tailed Godwit)*		IA	
40.	24690	*Macronectes giganteus (Southern Giant Petrel)*		IA	
41.	48591	*Pandion cristatus (Osprey, Eastern Osprey)*		IA	
42.	24802	*Philomachus pugnax (Ruff, reeve)*		IA	
43.	24843	*Plegadis falcinellus (Glossy Ibis)*		IA	
44.	24382	*Pluvialis fulva (Pacific Golden Plover)*		IA	
45.	24383	*Pluvialis squatarola (Grey Plover)*		IA	
46.	24526	*Sterna hirundo subsp. hirundo (Common Tern)*		IA	Y
47.	48597	*Thalasseus bergii (Crested Tern)*		IA	
48.	24806	*Tringa glareola (Wood Sandpiper)*		IA	
49.	24808	*Tringa nebularia (Common Greenshank, greenshank)*		IA	
50.	24809	*Tringa stagnatilis (Marsh Sandpiper, little greenshank)*		IA	
51.	41351	*Xenus cinereus (Terek Sandpiper)*		IA	
Other specially protected fauna					
52.	25624	*Falco peregrinus (Peregrine Falcon)*		S	
Priority 1					
53.	14932	*Acacia lasiocarpa var. bracteolata long peduncle variant (G.J. Keighery 5026)*		P1	
54.	45014	*Amanita quenda*		P1	
55.	33994	*Throscodectes xiphos (Stylet Bush Cricket, Stylet Throsco (Jandakot))*		P1	Y
Priority 2					
56.	46333	*Amanita wadulawitu (Long-spored Lepidella)*		P2	
57.	42022	*Poranthera moorokatta*		P2	
58.	1717	*Thelymitra variegata (Queen of Sheba)*		P2	
Priority 3					
59.	18195	*Amanita carneiphylla*		P3	
60.	45013	*Amanita drummondii*		P3	
61.	43543	*Amanita fibrillopes*		P3	
62.	48332	*Amanita preissii (Cinnamon-ring Lepidella)*		P3	
63.	43542	*Amanita wadjukiorum*		P3	
64.	35317	*Austrostipa mundula*		P3	
65.	3178	*Byblis gigantea (Rainbow Plant)*		P3	
66.	16245	*Cyathochaeta teretifolia*		P3	
67.	7485	*Dampiera triloba*		P3	
68.	11461	*Hibbertia spicata subsp. leptotheca*		P3	
69.	48935	*Idiosoma sigillatum (Swan Coastal Plain shield-backed trapdoor spider)*		P3	
70.	20462	*Jacksonia gracillima*		P3	
71.	33982	*Leioproctus contrarius (a short-tongued bee)*		P3	
72.	25147	*Lerista lineata (Perth Slider, Lined Skink)*		P3	
73.	25249	*Neelaps calonotos (Black-striped Snake, black-striped burrowing snake)*		P3	
74.	11557	*Phlebocarya pilosissima subsp. pilosissima*		P3	
75.	5237	*Pimelea calcicola*		P3	
76.	8163	*Pithocarpa corymbulosa (Corymbose Pithocarpa)*		P3	
77.	25800	*Stylidium paludicola*		P3	
78.	48297	*Styphelia filifolia*		P3	
79.	24855	*Tyto novaehollandiae subsp. novaehollandiae (Masked Owl (southwest))*		P3	
Priority 4					
80.	4763	*Dodonaea hackettiana (Hackett's Hopbush)*		P4	
81.	24189	*Falsistrellus mackenziei (Western False Pipistrelle, Western Falsistrelle)*		P4	
82.	24215	*Hydromys chrysogaster (Water-rat, Rakali)*		P4	
83.	48588	*Isoodon fusciventer (Quenda, southwestern brown bandicoot)*		P4	
84.	47975	*Ixobrychus dubius (Australian Little Bittern)*		P4	
85.	4035	*Kennedia beckxiana (Cape Arid Kennedia)*		P4	
86.	33742	*Microtis quadrata*		P4	
87.	48024	*Notamacropus eugenii subsp. derbianus (Tammar Wallaby, Tammar)*		P4	
88.	48022	*Notamacropus irma (Western Brush Wallaby)*		P4	
89.	24328	*Oxyura australis (Blue-billed Duck)*		P4	
90.	24663	*Phaethon rubricauda (Red-tailed Tropicbird)*		P4	
91.	7756	*Stylidium longitubum (Jumping Jacks)*		P4	
92.	33992	*Synemon gratiosa (Graceful Sunmoth)*		P4	
93.	48135	*Thinornis rubricollis (Hooded Plover, Hooded Dotterel)*		P4	
94.	24803	*Tringa brevipes (Grey-tailed Tattler)*		P4	
95.	44444	*Tripterococcus sp. Brachylobus (A.S. George 14234)*		P4	
96.	14714	*Verticordia lindleyi subsp. lindleyi*		P4	
Non-conservation taxon					
97.		*?Adenanthos obovatus*			Y
98.		*?Amphipogon turbinatus*			Y

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99.		*?Anigozanthos humilis*			
100.		*?Asparagus asparagoides*			Y
101.		*?Astroloma pallidum*			Y
102.		*?Austrostipa compressa*			
103.		*?Boronia ramosa*			Y
104.		*?Briza maxima*			Y
105.		*?Burchardia congesta*			
106.		*?Caesia sp.*			Y
107.		*?Caladenia discoidea*			Y
108.		*?Calandrinia sp.*			Y
109.		*?Calytrix angulata*			Y
110.		*?Calytrix flavescens*			Y
111.		*?Calytrix sp.*			Y
112.		*?Chamaescilla corymbosa*			Y
113.		*?Cirsium vulgare*			Y
114.		*?Conostylis aculeata*			Y
115.		*?Conostylis juncea*			Y
116.		*?Conostylis sp.*			Y
117.		*?Conyza bonariensis*			Y
118.		*?Dampiera linearis*			Y
119.		*?Dasypogon bromeliifolius*			Y
120.		*?Diuris corymbosa/magnifica*			Y
121.		*?Ehrharta calycina*			Y
122.		*?Epilobium hirtigerum*			Y
123.		*?Epilobium sp.*			
124.		*?Eremaea pauciflora*			Y
125.		*?Euchiton sphaericus*			Y
126.		*?Gonocarpus pithyoides*			Y
127.		*?Haemodorum spicatum*			
128.		*?Hemiandra sp.*			Y
129.		*?Hibbertia subvaginata*			Y
130.		*?Hovea trisperma var. trisperma*			
131.		*?Hypocalymma angustifolia*			Y
132.		*?Isolepis marginata*			Y
133.		*?Kunzea glabrescens*			
134.		*?Lactuca serriola*			Y
135.		*?Lepidosperma sp.*			Y
136.		*?Lepidosperma squamatum s.l.*			
137.		*?Leptomeria empetriformis*			Y
138.		*?Leucopogon conostephioides*			Y
139.		*?Lomandra caespitosa*			
140.		*?Lomandra sp.*			Y
141.		*?Lomandra suaveolens*			Y
142.		*?Lotus subbiflorus*			
143.		*?Lysimachia arvensis*			
144.		*?Melaleuca thymoides*			Y
145.		*?Microlaena stipoides*			
146.		*?Monoculus monstrosus*			Y
147.		*?Opercularia vaginata*			Y
148.		*?Pelargonium capitatum*			Y
149.		*?Petrophile linearis*			Y
150.		*?Petrorhagia dubia*			Y
151.		*?Philotheca spicata*			Y
152.		*?Phlebocarya ciliata*			
153.		*?Phlebocarya filifolia*			Y
154.		*?Phlebocarya sp.*			Y
155.		*?Podotheca sp.*			Y
156.		*?Pterostylis sanguinea*			
157.		*?Rhodanthe citrina*			Y
158.		*?Romulea rosea*			Y
159.		*?Rytidosperma occidentalis*			
160.		*?Schoenus curvifolius*			Y
161.		*?Scholtzia involucrata*			Y
162.		*?Solanum nigrum*			Y
163.		*?Sowerbaea laxiflora*			
164.		*?Stylidium repens*			Y
165.		*?Stylidium schoenoides*			Y
166.		*?Thysanotus manglesianus/patersonii complex*			Y
167.		*?Urospermum picroides*			Y
168.		*?Wahlenbergia capensis*			Y

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169.		*?Wahlenbergia preissii*			Y
170.		*?Wahlenbergia sp.*			Y
171.		*?Xanthorrhoea brunonis*			Y
172.		*?Zantedeschia aethiopica*			Y
173.		*Acacia ?pulchella*			Y
174.	3207	*Acacia alata (Winged Wattle)*			
175.	15466	*Acacia applanata*			
176.	3262	*Acacia cochlearis (Rigid Wattle)*			
177.	3282	*Acacia cyclops (Coastal Wattle)*			
178.	3307	*Acacia divergens*			
179.	3374	*Acacia huegelii*			
180.	3409	*Acacia lasiocarpa (Panjang)*			
181.	11611	*Acacia lasiocarpa var. lasiocarpa*			
182.	17861	*Acacia longifolia*	Y		
183.	3502	*Acacia pulchella (Prickly Moses)*			
184.		*Acacia pulchella ?var glaberrima*			Y
185.	15481	*Acacia pulchella var. glaberrima*			
186.	3525	*Acacia rostellifera (Summer-scented Wattle)*			
187.	3527	*Acacia saligna (Orange Wattle, Kudjong)*			
188.	30032	*Acacia saligna subsp. saligna*			
189.		*Acacia sp.*			
190.	3557	*Acacia stenoptera (Narrow Winged Wattle)*			
191.	3581	*Acacia trigonophylla*			
192.	3584	*Acacia truncata*			
193.	3602	*Acacia willdenowiana (Grass Wattle)*			
194.	24260	*Acanthiza apicalis (Broad-tailed Thornbill, Inland Thornbill)*			
195.	24261	*Acanthiza chrysorrhoa (Yellow-rumped Thornbill)*			
196.	24262	*Acanthiza inornata (Western Thornbill)*			
197.	1208	*Acanthocarpus preissii*			
198.	24560	*Acanthorhynchus superciliosus (Western Spinebill)*			
199.	25535	*Accipiter cirrocephalus (Collared Sparrowhawk)*			
200.	25536	*Accipiter fasciatus (Brown Goshawk)*			
201.	24282	*Accipiter fasciatus subsp. fasciatus (Brown Goshawk)*			
202.		*Acentrogobius bifrenatus*			
203.		*Acercella falcipes*			
204.	42368	*Acritoscincus trilineatus (Western Three-lined Skink)*			
205.	25755	*Acrocephalus australis (Australian Reed Warbler)*			
206.	24831	*Acrocephalus australis subsp. gouldi (Australian Reed Warbler)*			
207.	1775	*Adenanthos cygnorum (Common Woollybush)*			
208.	11837	*Adenanthos cygnorum subsp. cygnorum (Common Woollybush)*			
209.	1791	*Adenanthos obovatus (Basket Flower)*			
210.	4582	*Adriana quadripartita (Bitter Bush)*			
211.	25544	*Aegotheles cristatus (Australian Owlet-nightjar)*			
212.		*Afurcagobius suppositus*			
213.		*Agaricus sp.*			
214.	17202	*Agonis flexuosa var. flexuosa*			
215.	17028	*Ailanthus altissima (Tree of Heaven)*	Y		
216.	184	*Aira caryophyllea (Silvery Hairgrass)*	Y		
217.		*Aira caryophyllea/cupaniana group*			
218.	185	*Aira cupaniana (Silvery Hairgrass)*	Y		
219.	187	*Aira praecox (Early Hairgrass)*	Y		
220.		*Aira/Pentameris sp.*			Y
221.	48513	*Aizoon pubescens*	Y		
222.		*Akamptogonus novarae*			
223.	1728	*Allocasuarina fraseriana (Sheoak, Kondil)*			
224.	1732	*Allocasuarina humilis (Dwarf Sheoak)*			
225.		*Allothereua maculata*			
226.	2652	*Alternanthera nodiflora (Common Joyweed)*			
227.	4906	*Alyogyne huegelii (Lilac Hibiscus)*			
228.	38754	*Amanita conicobulbosa*			
229.	48320	*Amanita eucalypti*			
230.	38755	*Amanita ochroterrea*			
231.	2656	*Amaranthus caudatus (Love Lies Bleeding)*	Y		
232.	2668	*Amaranthus powellii (Powell's Amaranth)*	Y		
233.	2671	*Amaranthus viridis (Green Amaranth)*	Y		
234.	198	*Amphipogon laguroides*			
235.	20184	*Amphipogon laguroides subsp. laguroides*			
236.	200	*Amphipogon turbinatus*			
237.		*Aname mainae*			
238.		*Aname tepperi*			

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239.	24310	*Anas castanea (Chestnut Teal)*			
240.	24312	*Anas gracilis (Grey Teal)*			
241.	24313	*Anas platyrhynchos (Mallard)*			
242.		*Anas platyrhynchos subsp. domesticus*			
243.	24315	*Anas rhynchotis (Australasian Shoveler)*			
244.	24316	*Anas superciliosa (Pacific Black Duck)*			
245.	7833	*Angianthus preissianus*			
246.	47414	*Anhinga novaehollandiae (Australasian Darter)*			
247.		*Anigozanthos ?humilis*			Y
248.	1409	*Anigozanthos humilis (Catspaw)*			
249.	11434	*Anigozanthos humilis subsp. humilis*			
250.	1411	*Anigozanthos manglesii (Mangles Kangaroo Paw, Kurulbrang)*			
251.	11261	*Anigozanthos manglesii subsp. manglesii*			
252.		*Anigozanthos sp.*			
253.	44629	*Anilios australis*			
254.		*Anoplocapros lenticularis*			
255.		*Anser anser*			
256.	24561	*Anthochaera carunculata (Red Wattlebird)*			
257.	24562	*Anthochaera lunulata (Western Little Wattlebird)*			
258.	12724	*Anthotium junciforme*			
259.	3686	*Aotus cordifolia*			
260.	3688	*Aotus gracillima*			
261.	3692	*Aotus procumbens*			
262.	6210	*Apium annuum*			
263.	6211	*Apium prostratum (Sea Celery)*			
264.		*Aploactisoma milesii*			
265.		*Aplosporella yalgorensis*			Y
266.		*Apogon rueppellii*			
267.	24991	*Aprasia repens (Sand-plain Worm-lizard)*			
268.	24285	*Aquila audax (Wedge-tailed Eagle)*			
269.		*Arachnura higginsi*			
270.		*Araneus cyphoxis*			
271.		*Araneus eburneiventris*			
272.		*Araneus senicaudatus*			
273.	7838	*Arctotheca calendula (Cape Weed, African Marigold)*	Y		
274.	38963	*Arcyria affinis*			Y
275.	38964	*Arcyria cinerea*			
276.	38965	*Arcyria denudata*			
277.	38966	*Arcyria ferruginea*			
278.	38967	*Arcyria incarnata*			
279.	38968	*Arcyria insignis*			
280.	38970	*Arcyria obvelata*			
281.	38973	*Arcyria pomiformis*			
282.	38974	*Arcyria stipata*			Y
283.	25558	*Ardea ibis (Cattle Egret)*			
284.	25559	*Ardea intermedia (Intermediate Egret)*			
285.	41324	*Ardea modesta (great egret, white egret)*			
286.	24340	*Ardea novaehollandiae (White-faced Heron)*			
287.	24341	*Ardea pacifica (White-necked Heron)*			
288.	19883	*Arenaria leptoclados*	Y		
289.	17797	*Argemone ochroleuca subsp. ochroleuca*	Y		
290.		*Argiope trifasciata*			
291.	28293	*Argyranthemum frutescens subsp. foeniculaceum*	Y		
292.		*Arkys walckenaeri*			
293.	1264	*Arnocrinum preissii*			
294.	25566	*Artamus cinereus (Black-faced Woodswallow)*			
295.	24353	*Artamus cyanopterus (Dusky Woodswallow)*			
296.		*Artema atlanta*			
297.		*Artoria flavimana*			
298.		*Artoria linnaei*			
299.		*Artoria taeniifera*			
300.	20752	*Asparagus aethiopicus*	Y		
301.	8779	*Asparagus asparagoides (Bridal Creeper)*	Y		
302.	1364	*Asphodelus fistulosus (Onion Weed)*	Y		
303.	20283	*Astartea scoparia (Common Astartea)*			
304.		*Asteraceae sp.*			
305.	7851	*Asteridea pulverulenta (Common Bristle Daisy)*			
306.	6323	*Astroloma ciliatum (Candle Cranberry)*			
307.	6334	*Astroloma pallidum (Kick Bush)*			
308.	6339	*Astroloma xerophyllum*			

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309.		*Atherinomorus vaigiensis*			
310.	2452	*Atriplex cinerea (Grey Saltbush)*			
311.	2471	*Atriplex prostrata (Hastate Orache)*	Y		
312.		*Austracantha minax*			
313.		*Austrogautieria manjimupana*			
314.	47713	*Austronomus australis (White-striped Free-tailed Bat)*			
315.		*Austrostipa ?compressa*			
316.	17234	*Austrostipa compressa*			
317.	17240	*Austrostipa flavescens*			
318.	17245	*Austrostipa mollis*			
319.	17253	*Austrostipa semibarbata*			
320.		*Austrostipa sp.*			
321.	37421	*Austrostipa sp. Marchagee (B.R. Maslin 1407)*			
322.	231	*Avellinia michelii*	Y		
323.	233	*Avena barbata (Bearded Oat)*	Y		
324.	234	*Avena fatua (Wild Oat)*	Y		
325.	24318	*Aythya australis (Hardhead)*			
326.	17737	*Azolla pinnata*			
327.	42902	*Azolla rubra*			
328.	36441	*Babingtonia camphorosmae (Camphor Myrtle)*			
329.		*Backobourkia heroine*			
330.		*Badhamia affinis*			Y
331.	38975	*Badhamia capsulifera*			Y
332.	38976	*Badhamia foliicola*			
333.	38977	*Badhamia goniospora*			Y
334.		*Badumna insignis*			
335.		*Ballarra longipalpus*			
336.		*Banksia ?menziesii*			Y
337.	1800	*Banksia attenuata (Slender Banksia, Piara)*			
338.	32580	*Banksia dallanneyi subsp. dallanneyi var. dallanneyi*			
339.	1819	*Banksia grandis (Bull Banksia, Pulgarla)*			
340.	1822	*Banksia ilicifolia (Holly-leaved Banksia)*			
341.	1830	*Banksia littoralis (Swamp Banksia, Pungura)*			
342.	1834	*Banksia menziesii (Firewood Banksia)*			
343.	32077	*Banksia sessilis var. cygnorum*			
344.		*Banksia sp.*			
345.	1852	*Banksia telmatiaea (Swamp Fox Banksia)*			
346.		*Barnardius zonarius*			
347.	38765	*Battarrea stevenii*			
348.	741	*Baumea articulata (Jointed Rush)*			
349.	743	*Baumea juncea (Bare Twigrush)*			
350.	744	*Baumea laxa*			
351.	745	*Baumea preissii*			
352.	748	*Baumea vaginalis (Sheath Twigrush)*			
353.	5382	*Beaufortia elegans (Elegant Beaufortia)*			
354.	7046	*Bellardia trixago (Bellardia)*	Y		
355.	48868	*Bellardia viscosa*	Y		
356.	7855	*Bidens pilosa (Cobbler's Pegs)*	Y		
357.	25788	*Billardiera fraseri (Elegant Pronaya)*			
358.	24319	*Biziura lobata (Musk Duck)*			
359.	749	*Bolboschoenus caldwellii (Marsh Club-rush)*			
360.		*Boletus sp.*			
361.	4413	*Boronia crenulata (Aniseed Boronia)*			
362.	11503	*Boronia crenulata subsp. crenulata var. crenulata*			
363.	16636	*Boronia crenulata subsp. viminea*			
364.	4417	*Boronia dichotoma*			
365.	4420	*Boronia fastigiata (Bushy Boronia)*			
366.	4438	*Boronia ramosa*			
367.	11381	*Boronia ramosa subsp. anethifolia*			
368.	3710	*Bossiaea eriocarpa (Common Brown Pea)*			
369.	6341	*Brachyloma preissii (Globe Heath)*			
370.	8661	*Brachypodium distachyon (False Brome)*	Y		
371.	7867	*Brachyscome bellidioides*			
372.	7878	*Brachyscome iberidifolia*			
373.	42380	*Brachyurophis fasciolatus subsp. fasciolatus (Narrow-banded Shovel-nosed Snake)*			
374.	42381	*Brachyurophis semifasciatus (Southern Shovel-nosed Snake)*			
375.	3000	*Brassica tournefortii (Mediterranean Turnip)*	Y		
376.	2995	*Brassica x napus*	Y		
377.	244	*Briza maxima (Blowfly Grass)*	Y		
378.	245	*Briza minor (Shivery Grass)*	Y		

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379.	249	*Bromus diandrus (Great Brome)*	Y		
380.	250	*Bromus hordeaceus (Soft Brome)*	Y		
381.	6537	*Buddleja madagascariensis*	Y		
382.	42104	*Buellia albula*			
383.	1383	*Burchardia bairdiae*			
384.	12770	*Burchardia congesta*			
385.	25714	*Cacatua pastinator (Western Long-billed Corella)*			
386.	25715	*Cacatua roseicapilla (Galah)*			
387.	25716	*Cacatua sanguinea (Little Corella)*			
388.	24729	*Cacatua tenuirostris (Eastern Long-billed Corella)*	Y		
389.	25598	*Cacomantis flabelliformis (Fan-tailed Cuckoo)*			
390.	42307	*Cacomantis pallidus (Pallid Cuckoo)*			
391.	1276	*Caesia micrantha (Pale Grass Lily)*			
392.	1277	*Caesia occidentalis*			
393.		*Caesia sp.*			
394.	3002	*Cakile maritima (Sea Rocket)*	Y		
395.		*Caladenia ?arenicola*			Y
396.		*Caladenia ?discoidea*			Y
397.		*Caladenia ?flava*			
398.		*Caladenia ?longicauda subsp. calcigena*			Y
399.	15330	*Caladenia arenicola*			
400.	1586	*Caladenia discoidea (Dancing Orchid)*			
401.	1592	*Caladenia flava (Cowslip Orchid)*			
402.	15348	*Caladenia flava subsp. flava*			
403.	15502	*Caladenia footeana*			
404.	15352	*Caladenia georgei*			
405.	1599	*Caladenia latifolia (Pink Fairy Orchid)*			
406.	15361	*Caladenia longicauda subsp. calcigena*			
407.	1605	*Caladenia marginata (White Fairy Orchid)*			
408.	15371	*Caladenia nana subsp. nana*			
409.	17760	*Caladenia nobilis*			
410.	17589	*Caladenia occidentalis*			
411.	15503	*Caladenia paludosa*			
412.		*Caladenia sp.*			
413.	18019	*Caladenia vulgata*			
414.	2845	*Calandrinia brevipedata (Short-stalked Purslane)*			
415.	2846	*Calandrinia calyptrata (Pink Purslane)*			
416.	2848	*Calandrinia corrigioloides (Strap Purslane)*			
417.	2854	*Calandrinia granulifera (Pygmy Purslane)*			
418.	2856	*Calandrinia liniflora (Parakeelya)*			
419.		*Calandrinia sp.*			
420.	44722	*Calceolaria tripartita*	Y		Y
421.	19309	*Calectasia narragara*			
422.	24787	*Calidris minuta (Little Stint)*			
423.	34942	*Callitriche brutia subsp. brutia*	Y		
424.	96	*Callitris preissii (Rottnest Island Pine, Maro)*			
425.	36600	*Callitris pyramidalis (Swamp Cypress)*			
426.		*Calocera guepinioides*			
427.	38981	*Calomyxa metallica*			
428.	5411	*Calothamnus hirsutus*			
429.	5415	*Calothamnus lateralis*			
430.	5426	*Calothamnus quadrifidus (One-sided Bottlebrush, Kwowdjard)*			
431.	35816	*Calothamnus quadrifidus subsp. quadrifidus*			
432.	5429	*Calothamnus sanguineus (Silky-leaved Blood flower, Pindak)*			
433.	5433	*Calothamnus validus (Barrens Clawflower)*			
434.	25717	*Calyptorhynchus banksii (Red-tailed Black-Cockatoo)*			
435.		*Calytrix ?angulata*			Y
436.	5439	*Calytrix angulata (Yellow Starflower)*			
437.		*Calytrix angulata/flavescens*			Y
438.	5458	*Calytrix flavescens (Summer Starflower)*			
439.	5460	*Calytrix fraseri (Pink Summer Calytrix)*			
440.		*Calytrix leschenaultii/fraseri*			Y
441.	5476	*Calytrix sapphirina*			
442.		*Calytrix sp.*			
443.	38767	*Campanella gregaria*			
444.	32338	*Campylopus introflexus*	Y		
445.		*Carassius auratus*			
446.	49010	*Cardamine occulta*	Y		
447.	17318	*Cardiospermum grandiflorum*	Y		
448.	7909	*Carduus pycnocephalus (Slender Thistle)*	Y		

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
449.	2794	*Carpobrotus aequilaterus (Angular Pigface)*	Y		
450.	2795	*Carpobrotus edulis (Hottentot Fig)*	Y		
451.	1162	*Cartonema philydroides*			
452.	2951	*Cassytha flava (Dodder Laurel)*			
453.	2957	*Cassytha racemosa (Dodder Laurel)*			
454.	1742	*Casuarina obesa (Swamp Sheoak, Kuli)*			
455.	41563	*Cenchrus purpureus (Elephant Grass)*	Y		
456.	41568	*Cenchrus setaceus (Fountain Grass)*	Y		
457.	7915	*Centaurea calcitrapa (Star Thistle)*	Y		
458.	7916	*Centaurea melitensis (Maltese Cockspur, Malta Thistle)*	Y		
459.	6539	*Centaurium erythraea (Common Centaury)*	Y		
460.	6542	*Centaurium tenuiflorum*	Y		
461.	6214	*Centella asiatica*			
462.	1121	*Centrolepis aristata (Pointed Centrolepis)*			
463.	1125	*Centrolepis drummondiana*			
464.	1131	*Centrolepis inconspicua*			
465.	1134	*Centrolepis polygyna (Wiry Centrolepis)*			
466.	2889	*Cerastium glomeratum (Mouse Ear Chickweed)*	Y		
467.	38982	*Ceratiomyxa fruticulosa*			
468.		*Cercophonius sulcatus*			
469.	17685	*Chaetanthus aristatus*			
470.	24186	*Chalinolobus gouldii (Gould's Wattled Bat)*			
471.	24187	*Chalinolobus morio (Chocolate Wattled Bat)*			
472.	18156	*Chamaecytisus palmensis (Tagasaste)*	Y		
473.	1280	*Chamaescilla corymbosa (Blue Squill)*			
474.	11299	*Chamaescilla corymbosa var. corymbosa*			
475.	24377	*Charadrius ruficapillus (Red-capped Plover)*			
476.	1513	*Chasmanthe floribunda (African Cornflag)*	Y		
477.	43380	*Chelodina colliei (South-western Snake-necked Turtle)*			
478.	24321	*Chenonetta jubata (Australian Wood Duck, Wood Duck)*			
479.	2483	*Chenopodium album (Fat Hen)*	Y		
480.	2490	*Chenopodium glaucum (Glaucous Goosefoot)*	Y		
481.	2491	*Chenopodium macrospermum*	Y		
482.	47909	*Cheramoeca leucosterna (White-backed Swallow)*			
483.	33939	*Cherax cainii (Marron)*			
484.		*Cherax destructor*			
485.		*Cherax preissii*			
486.		*Cherax quinquecarinatus*			
487.		*Cherax sp.*			
488.		*Chiloscyphus semiteres var. semiteres*			
489.	7925	*Chondrilla juncea (Skeleton Weed)*	Y		
490.	17706	*Chordifex sinuosus*			
491.	8971	*Chorizema cordatum*			
492.	24980	*Christinus marmoratus (Marbled Gecko)*			
493.		*Chroicocephalus novaehollandiae*			
494.	41787	*Chrysanthemoides monilifera subsp. rotundata*	Y		
495.	25601	*Chrysococcyx lucidus (Shining Bronze Cuckoo)*			
496.	24432	*Chrysococcyx lucidus subsp. plagosus (Shining Bronze Cuckoo)*			
497.	24288	*Circus approximans (Swamp Harrier)*			
498.	24289	*Circus assimilis (Spotted Harrier)*			
499.	7937	*Cirsium vulgare (Spear Thistle, Scotch Thistle)*	Y		
500.	24774	*Cladorhynchus leucocephalus (Banded Stilt)*			
501.	26662	*Cladostephus spongiosus*			
502.	38983	*Clastoderma debaryanum*			
503.	10804	*Clematis linearifolia*			
504.		*Clynotis albobarbatus*			
505.		*Cnidoglanis macrocephalus*			
506.	26682	*Codium spinescens*			
507.	25675	*Colluricincla harmonica (Grey Shrike-thrush)*			
508.	24399	*Columba livia (Domestic Pigeon)*	Y		
509.	38986	*Comatricha elegans*			
510.	38988	*Comatricha laxa*			
511.	38990	*Comatricha nigra*			
512.	38991	*Comatricha pulchella*			
513.	38994	*Comatricha tenerrima*			
514.	4550	*Comesperma calymega (Blue-spike Milkwort)*			
515.	4552	*Comesperma confertum*			
516.	4554	*Comesperma flavum*			
517.	4555	*Comesperma integerrimum*			
518.	1858	*Conospermum amoenum (Blue Smokebush)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
519.	15611	*Conospermum stoechadis subsp. stoechadis (Common Smokebush)*			
520.	6348	*Conostephium pendulum (Pearl Flower)*			
521.	6349	*Conostephium preissii*			
522.		*Conostylis ?juncea*			Y
523.	1418	*Conostylis aculeata (Prickly Conostylis)*			
524.	11826	*Conostylis aculeata subsp. aculeata*			
525.	1423	*Conostylis aurea (Golden Conostylis)*			
526.	1427	*Conostylis candicans (Grey Cottonhead)*			
527.	11438	*Conostylis candicans subsp. candicans*			
528.	1436	*Conostylis juncea*			
529.	1453	*Conostylis serrulata*			
530.	1454	*Conostylis setigera (Bristly Cottonhead)*			
531.	11597	*Conostylis setigera subsp. setigera*			
532.	1455	*Conostylis setosa (White Cottonhead)*			
533.		*Conostylis sp.*			
534.	6611	*Convolvulus arvensis (Field Bindweed)*	Y		
535.		*Conyza ?bonariensis*			
536.	7939	*Conyza bonariensis (Flaxleaf Fleabane)*	Y		
537.		*Conyza sp.*			
538.	20074	*Conyza sumatrensis*	Y		
539.	25568	*Coracina novaehollandiae (Black-faced Cuckoo-shrike)*			
540.		*Cormocephalus aurantiipes*			
541.		*Cormocephalus novaehollandiae*			
542.		*Cormocephalus rubriceps*			
543.	2891	*Corrigiola litoralis (Strapwort)*	Y		
544.	48259	*Cortaderia selloana subsp. selloana*	Y		
545.	24416	*Corvus bennetti (Little Crow)*			
546.	25592	*Corvus coronoides (Australian Raven)*			
547.	24417	*Corvus coronoides subsp. perplexus (Australian Raven)*			
548.	17104	*Corymbia calophylla (Marri)*			
549.	1285	*Corynotheca micrantha (Sand Lily)*			
550.	7945	*Cotula coronopifolia (Waterbuttons)*	Y		
551.	24671	*Coturnix pectoralis (Stubble Quail)*			
552.	25701	*Coturnix ypsilophora (Brown Quail)*			
553.	24420	*Cracticus nigrogularis (Pied Butcherbird)*			
554.	25595	*Cracticus tibicen (Australian Magpie)*			
555.	24422	*Cracticus tibicen subsp. dorsalis (White-backed Magpie)*			
556.	25596	*Cracticus torquatus (Grey Butcherbird)*			
557.		*Crassula ?colorata*			Y
558.	3136	*Crassula alata*	Y		
559.	3137	*Crassula colorata (Dense Stonecrop)*			
560.	11709	*Crassula colorata var. acuminata*			
561.	3139	*Crassula exserta*			
562.	3140	*Crassula glomerata*	Y		
563.	3142	*Crassula natans*	Y		
564.	38997	*Craterium leucocephalum*			
565.	38998	*Craterium minutum*			
566.		*Craterocephalus mugiloides*			
567.	38780	*Crepidotus eucalyptorum*			
568.	39000	*Cribraria aurantiaca*			Y
569.	39001	*Cribraria cancellata*			
570.	39002	*Cribraria microcarpa*			
571.	39003	*Cribraria minutissima*			
572.	39006	*Cribraria tenella*			
573.	25398	*Crinia georgiana (Quacking Frog)*			
574.	25399	*Crinia glauerti (Clicking Frog)*			
575.	25400	*Crinia insignifera (Squelching Froglet)*			
576.		*Cristiceps sp.*			
577.	13527	*Croninia kingiana*			
578.		*Crustulina bicruciata*			
579.	4802	*Cryptandra mutila*			
580.	30893	*Cryptoblepharus buchananii*			
581.	25020	*Cryptoblepharus plagiocephalus*			
582.		*Cryptoerithus quobba*			
583.	1627	*Cryptostylis ovata (Slipper Orchid)*			
584.	30899	*Ctenophorus adelaidensis (Southern Heath Dragon, Western Heath Dragon)*			
585.	25027	*Ctenotus australis*			
586.	25039	*Ctenotus fallens*			
587.	25040	*Ctenotus gemmula (Jewelled South-west Ctenotus (Swan Coastal Plain subpop P3), skink)*			

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588.	25047	*Ctenotus impar*			
589.	6663	*Cuscuta epithymum (Lesser Dodder, Greater Dodder)*	Y		
590.	51	*Cyathea cooperi*	Y		
591.		*Cyclosa trilobata*			
592.	40660	*Cycnogeton huegelii*			
593.	24322	*Cygnus atratus (Black Swan)*			
594.	19625	*Cymbalaria muralis subsp. muralis*	Y		
595.	283	*Cynodon dactylon (Couch)*	Y		
596.	783	*Cyperus congestus (Dense Flat-sedge)*	Y		
597.	806	*Cyperus polystachyos (Bunchy Sedge)*			
598.	816	*Cyperus tenuiflorus (Scaly Sedge)*	Y		
599.		*Cyrtophora parnasia*			
600.	10916	*Cyrtostylis huegelii*			
601.	10942	*Cyrtostylis tenuissima*			
602.	26729	*Cystophora subfarcinata*			
603.	30901	*Dacelo novaeguineae (Laughing Kookaburra)*	Y		
604.	7454	*Dampiera linearis (Common Dampiera)*			
605.	7462	*Dampiera pedunculata*			
606.		*Daphnia carinata*			
607.	25673	*Daphoenositta chrysoptera (Varied Sittella)*			
608.	24687	*Daption capense (Cape Petrel)*			
609.	5508	*Darwinia citriodora (Lemon-scented Darwinia)*			
610.	35618	*Darwinia sp. Karonie (K. Newbey 8503)*			
611.	1218	*Dasypogon bromeliifolius (Pineapple Bush)*			
612.	6218	*Daucus glochidiatus (Australian Carrot)*			
613.	15656	*Daviesia brachyphylla*			
614.	19747	*Daviesia decurrens subsp. decurrens*			
615.	3807	*Daviesia divaricata (Marno)*			
616.	18560	*Daviesia divaricata subsp. divaricata*			
617.	16585	*Daviesia nudiflora subsp. nudiflora*			
618.	3832	*Daviesia physodes*			
619.	3845	*Daviesia triflora*			
620.		*Delena cancerides*			
621.	25766	*Delma fraseri (Fraser's Legless Lizard)*			
622.	24999	*Delma grayii*			
623.	25468	*Demansia psammophis (Yellow-faced Whipsnake)*			
624.	25296	*Demansia psammophis subsp. reticulata (Yellow-faced Whipsnake)*			
625.	24324	*Dendrocygna arcuata (Wandering Whistling Duck, Chestnut Whistling Duck)*			
626.		*Dermocybe clelandii*			
627.	17691	*Desmocladus fasciculatus*			
628.	16595	*Desmocladus flexuosus*			
629.	299	*Deyeuxia quadriseta (Reed Bentgrass)*			
630.	1259	*Dianella revoluta (Blueberry Lily)*			
631.	11636	*Dianella revoluta var. divaricata*			
632.	25607	*Dicaeum hirundinaceum (Mistletoebird)*			
633.	1287	*Dichopogon capillipes*			
634.	26758	*Dicranema revolutum*			
635.	32344	*Dicranoloma diaphanoneuron*			
636.	44064	*Dictydiaethalium plumbeum*			Y
637.	26764	*Dictyopteris australis*			
638.	26776	*Dictyota dichotoma*			
639.	39011	*Diderma asteroides*			
640.	39015	*Diderma hemisphaericum*			
641.	48606	*Diderma rufostriatum*			Y
642.	39017	*Didymium anellus*			
643.	39023	*Didymium perforatum*			Y
644.	39024	*Didymium serpula*			
645.	39025	*Didymium squamulosum*			
646.	32345	*Didymodon australasiae*			
647.	17838	*Dielsia stenostachya*			
648.		*Dingosa serrata*			
649.	4454	*Diplolaena dampieri (Southern Diplolaena)*			
650.	9027	*Diplolaena drummondii*			
651.	3011	*Diplotaxis muralis (Wall Rocket)*	Y		
652.	19649	*Disa bracteata*	Y		
653.	7054	*Dischisma arenarium*	Y		
654.	7961	*Dittrichia graveolens (Stinkwort)*	Y		
655.		*Diuris ?magnifica*			Y
656.		*Diuris corymbosa/magnifica*			
657.	1634	*Diuris laxiflora (Bee Orchid)*			

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658.	12939	*Diuris magnifica*			
659.		*Drosera ?porrecta*			
660.		*Drosera ?sp. "climbing"*			Y
661.	48751	*Drosera drummondii*			
662.	3095	*Drosera erythrorhiza (Red Ink Sundew)*			
663.	3097	*Drosera gigantea (Giant Sundew)*			
664.	3098	*Drosera glanduligera (Pimpernel Sundew)*			
665.	3106	*Drosera macrantha (Bridal Rainbow)*			
666.	3109	*Drosera menziesii (Pink Rainbow)*			
667.	48710	*Drosera micrantha*			
668.	3118	*Drosera pallida (Pale Rainbow)*			
669.	29178	*Drosera porrecta*			
670.	8911	*Drosera rosulata*			
671.		*Drosera sp.*			
672.		*Drosera sp. "climbing"*			
673.	3133	*Drosera subhirtella (Sunny Rainbow)*			
674.	3135	*Drosera zonaria (Painted Sundew)*			
675.	33500	*Dysphania ambrosioides (Mexican Tea)*	Y		
676.	11105	*Echinochloa crus-galli*	Y		
677.	39029	*Echinostelium minutum*			
678.	6681	*Echium plantagineum (Paterson's Curse)*	Y		
679.	25096	*Egernia kingii (King's Skink)*			
680.	25100	*Egernia napoleonis*			
681.		*Egretta garzetta*			
682.		*Egretta novaehollandiae*			
683.	347	*Ehrharta calycina (Perennial Veldt Grass)*	Y		
684.	349	*Ehrharta longiflora (Annual Veldt Grass)*	Y		
685.		*Ehrharta sp.*			
686.	42241	*Elaeomyxa reticulospora*			Y
687.		*Elanus axillaris*			
688.	25540	*Elanus caeruleus (Black-shouldered Kite)*			
689.	25250	*Elapognathus coronatus (Crowned Snake)*			
690.	5187	*Elatine gratioloides (Waterwort)*			
691.	47937	*Elseyornis melanops (Black-fronted Dotterel)*			
692.	1643	*Elythranthera brunonis (Purple Enamel Orchid)*			
693.	1644	*Elythranthera emarginata (Pink Enamel Orchid)*			
694.	39030	*Enerthenema papillatum*			
695.		*Eodelena convexa*			
696.		*Eolophus roseicapillus*			
697.	1645	*Epiblema grandiflorum (Babe-in-a-cradle)*			
698.	6132	*Epilobium ciliatum*	Y		
699.	6133	*Epilobium hirtigerum (Hairy Willow Herb)*			
700.		*Epinephelus sp.*			
701.	24567	*Epthianura albifrons (White-fronted Chat)*			
702.	376	*Eragrostis curvula (African Lovegrass)*	Y		
703.	13949	*Eremaea asterocarpa*			
704.	13950	*Eremaea asterocarpa subsp. asterocarpa*			
705.	5541	*Eremaea pauciflora*			
706.	14104	*Eremaea pauciflora var. pauciflora*			
707.	7215	*Eremophila glabra (Tar Bush)*			
708.	17175	*Eremophila glabra subsp. albicans*			
709.	1646	*Eriochilus dilatatus (White Bunny Orchid)*			
710.	15412	*Eriochilus dilatatus subsp. multiflorus*			
711.	15414	*Eriochilus helonomos*			
712.	15415	*Eriochilus scaber subsp. scaber*			
713.		*Eriophora biapicata*			
714.		*Ero aphana*			
715.	4332	*Erodium botrys (Long Storksbill)*	Y		
716.	4333	*Erodium cicutarium (Common Storksbill)*	Y		
717.	6219	*Eryngium pinnatifidum (Blue Devils)*			
718.	15446	*Eryngium pinnatifidum subsp. pinnatifidum*			
719.		*Erythracarus decoris*			
720.	24379	*Erythrogonys cinctus (Red-kneed Dotterel)*			
721.		*Ethmostigmus rubripes*			
722.		*Eucalyptus ?camaldulensis x robusta*			Y
723.		*Eucalyptus ?rudis*			Y
724.	17359	*Eucalyptus botryoides*	Y		
725.	5615	*Eucalyptus decipiens (Limestone Marlock, Moit)*			
726.	5659	*Eucalyptus gomphocephala (Tuart, Duart)*			
727.	48440	*Eucalyptus grandis*	Y		

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728.	5708	*Eucalyptus marginata (Jarrah, Djara)*			
729.	13547	*Eucalyptus marginata subsp. marginata (Jarrah)*			
730.	5739	*Eucalyptus patens (Swan River Blackbutt, Dwuda)*			
731.	5763	*Eucalyptus rudis (Flooded Gum, Kulurda)*			
732.	13511	*Eucalyptus rudis subsp. rudis*			
733.	5790	*Eucalyptus todtiana (Coastal Blackbutt)*			
734.	3872	*Euchilopsis linearis (Swamp Pea)*			
735.	15137	*Euchiton sphaericus*			
736.	4627	*Euphorbia helioscopia (Sun Spurge)*	Y		
737.	20014	*Euphorbia hyssopifolia*	Y		
738.	29940	*Euphorbia maculata*	Y		
739.	4636	*Euphorbia paralias (Sea Spurge)*	Y		
740.	4638	*Euphorbia peplus (Petty Spurge)*	Y		
741.	34757	*Euphorbia prostrata*	Y		
742.	4648	*Euphorbia terracina (Geraldton Carnation Weed)*	Y		
743.	3880	*Eutaxia virgata*			
744.	25621	*Falco berigora (Brown Falcon)*			
745.	25622	*Falco cenchroides (Australian Kestrel, Nankeen Kestrel)*			
746.	25623	*Falco longipennis (Australian Hobby)*			
747.	24041	*Felis catus (Cat)*	Y		
748.	20216	*Ficinia nodosa (Knotted Club Rush)*			
749.	1747	*Ficus carica (Common Fig)*	Y		
750.	894	*Fimbristylis velata*			
751.		*Fistulina hepatica*			
752.	27748	*Flavoparmelia rutidota*			
753.	6221	*Foeniculum vulgare (Fennel)*	Y		
754.	5209	*Frankenia pauciflora (Seaheath)*			
755.	18392	*Freesia alba x leichtlinii*	Y		
756.	27753	*Fulgensia bracteata*			
757.	27754	*Fulgensia subbracteata*			
758.	25727	*Fulica atra (Eurasian Coot)*			
759.	24761	*Fulica atra subsp. australis (Eurasian Coot)*			
760.	39033	*Fuligo septica*			
761.		*Fumaria ?capreolata*			Y
762.	2969	*Fumaria capreolata (Whiteflower Fumitory)*	Y		
763.		*Fumaria sp.*			
764.	30916	*Funambulus pennanti (Indian Palm Squirrel)*	Y		
765.	907	*Gahnia trifida (Coast Saw-sedge)*			
766.	7976	*Galinsoga parviflora (Potato Weed)*	Y		
767.	17348	*Galium aparine (Goosegrass)*	Y		
768.	7323	*Galium murale (Small Goosegrass)*	Y		
769.	25729	*Gallinula tenebrosa (Dusky Moorhen)*			
770.	24763	*Gallinula tenebrosa subsp. tenebrosa (Dusky Moorhen)*			
771.	25730	*Gallirallus philippensis (Buff-banded Rail)*			
772.	20247	*Gamochaeta calviceps*	Y		
773.	19195	*Gamochaeta pensylvanica*	Y		
774.	20475	*Gastrolobium capitatum*			
775.	20473	*Gastrolobium ebracteolatum*			
776.	20483	*Gastrolobium linearifolium*			
777.	20482	*Gastrolobium nervosum*			
778.	42314	*Gavicalis virescens (Singing Honeyeater)*			
779.		*Gea theridioides*			
780.	24959	*Gehyra variegata*			
781.	3936	*Genista linifolia (Flaxleaf Broom)*	Y		
782.		*Geogarypus taylori*			
783.	24401	*Geopelia cuneata (Diamond Dove)*			
784.	4339	*Geranium molle (Dove's Foot Cranesbill)*	Y		
785.	25530	*Gerygone fusca (Western Gerygone)*			
786.	24271	*Gerygone fusca subsp. fusca (Western Gerygone)*			
787.	1520	*Gladiolus caryophyllaceus (Wild Gladiolus)*	Y		
788.	47962	*Glyciphila melanops (Tawny-crowned Honeyeater)*			
789.	12624	*Gnephosis angianthoides*			
790.	6587	*Gomphocarpus fruticosus (Narrowleaf Cottonbush)*	Y		
791.	3945	*Gompholobium aristatum*			
792.	10909	*Gompholobium confertum*			
793.	3957	*Gompholobium tomentosum (Hairy Yellow Pea)*			
794.	6161	*Gonocarpus pithyoides*			
795.	26868	*Gracilaria cliftonii*			
796.	24443	*Grallina cyanoleuca (Magpie-lark)*			
797.	37500	*Grammatotheca bergiana var. bergiana*	Y		

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798.	14282	*Gratiola pubescens*			
799.	1982	*Grevillea crithmifolia*			
800.	2032	*Grevillea leucopteris (White Plume Grevillea)*			
801.	15839	*Grevillea preissii subsp. preissii*			
802.	12824	*Grevillea vestita subsp. vestita*			
803.		*Gymnopilus allantopus*			
804.	38789	*Gymnopilus junonius*			
805.		*Gymnopilus purpuratus*			
806.	32390	*Gymnostomum calcareum*			
807.	25627	*Haematopus fuliginosus (Sooty Oystercatcher)*			
808.	24487	*Haematopus longirostris (Pied Oystercatcher)*			
809.		*Haemodorum ?spicatum*			Y
810.	1470	*Haemodorum paniculatum (Mardja)*			
811.		*Haemodorum sp.*			
812.	1475	*Haemodorum spicatum (Mardja)*			
813.	2128	*Hakea amplexicaulis (Prickly Hakea)*			
814.	2197	*Hakea prostrata (Harsh Hakea)*			
815.	2214	*Hakea trifurcata (Two-leaf Hakea)*			
816.	2216	*Hakea varia (Variable-leaved Hakea)*			
817.	24293	*Haliaeetus leucogaster (White-bellied Sea-Eagle)*			
818.	24295	*Haliastur sphenurus (Whistling Kite)*			
819.	3961	*Hardenbergia comptoniana (Native Wisteria)*			
820.		*Hasarius adansoni*			
821.	25410	*Heleioporus eyrei (Moaning Frog)*			
822.	3016	*Heliophila pusilla*	Y		
823.	6710	*Heliotropium europaeum (Common Heliotrope)*	Y		
824.	16933	*Hemiandra glabra*			
825.	6838	*Hemiandra linearis (Speckled Snakebush)*			
826.	6839	*Hemiandra pungens (Snakebush)*			
827.	38320	*Hemiandra sp. Jurien (B.J. Conn & M.E. Tozer BJC 3885)*			
828.	25119	*Hemiergis quadrilineata*			
829.	6871	*Hemigenia sericea (Silky Hemigenia)*			
830.	1293	*Hensmania turbinata*			
831.	24961	*Heteronotia binoei (Bynoe's Gecko)*			
832.	26930	*Heterosiphonia crassipes*			
833.		*Heurodes turritus*			
834.	5134	*Hibbertia huegelii*			
835.		*Hibbertia huegelii complex*			
836.	5135	*Hibbertia hypericoides (Yellow Buttercups)*			
837.	45534	*Hibbertia hypericoides subsp. hypericoides*			
838.	5162	*Hibbertia racemosa (Stalked Guinea Flower)*			
839.		*Hibbertia racemosa/subvaginata*			Y
840.	43280	*Hibbertia sericosepala*			
841.	48381	*Hibbertia striata*			
842.	5173	*Hibbertia subvaginata*			
843.	5176	*Hibbertia vaginata*			
844.	47965	*Hieraaetus morphnoides (Little Eagle)*			
845.	25734	*Himantopus himantopus (Black-winged Stilt)*			
846.	24775	*Himantopus himantopus subsp. leucocephalus (Black-winged Stilt)*			
847.		*Hippocampus elongatus*			
848.	24491	*Hirundo neoxena (Welcome Swallow)*			
849.		*Hogna crispipes*			
850.	38793	*Hohenbuehelia bingarra*			
851.	444	*Holcus lanatus (Yorkshire Fog)*	Y		
852.	9051	*Homalanthus novo-guineensis*			
853.	6222	*Homalosciadium homalocarpum*			
854.	449	*Hordeum leporinum (Barley Grass)*	Y		
855.	3966	*Hovea pungens (Devil's Pins, Puyenak)*			
856.	3968	*Hovea trisperma (Common Hovea)*			
857.	12859	*Hovea trisperma var. trisperma*			
858.	12741	*Hyalosperma cotula*			
859.	5216	*Hybanthus calycinus (Wild Violet)*			
860.		*Hydnoplicata convoluta*			
861.	26949	*Hydroclathrus clathratus*			
862.	6226	*Hydrocotyle callicarpa (Small Pennywort)*			
863.	6240	*Hydrocotyle scutellifera*			
864.	25366	*Hydrophis elegans (Elegant Seasnake, Bar-bellied Seasnake)*			
865.	42410	*Hydrophis ornatus (Ornate Reef Seasnake, Sea Snake)*			
866.	43384	*Hydrophis platurus (Yellow-bellied Seasnake)*			
867.	38795	*Hygrocybe conica*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
868.	26966	*Hypnea charoides*			
869.	5817	*Hypocalymma angustifolium (White Myrtle, Kudjid)*			
870.	35070	*Hypocalymma angustifolium subsp. Swan Coastal Plain (G.J. Keighery 16777)*			
871.	5825	*Hypocalymma robustum (Swan River Myrtle)*			
872.	8086	*Hypochaeris glabra (Smooth Catsear)*	Y		
873.	9352	*Hypochaeris radicata (Flat Weed, Cats-ear)*	Y		
874.	1070	*Hypolaena exsulca*			
875.	17841	*Hypolaena pubescens*			
876.		*Idiommata blackwalli*			
877.	48521	*Inocybe froudistii*			
878.	6620	*Ipomoea cairica (Coast Morning Glory)*	Y		
879.	910	*Isolepis cernua (Nodding Club-rush)*			
880.	20200	*Isolepis cernua var. setiformis*			
881.	912	*Isolepis cyperoides*			
882.	917	*Isolepis marginata (Coarse Club-rush)*			
883.	921	*Isolepis producta*			
884.	10831	*Isolepis prolifera (Budding Club-rush)*	Y		
885.		*Isopeda leishmanni*			
886.	19700	*Isotropis cuneifolia subsp. cuneifolia*			
887.	8092	*Ixiolaena viscosa (Sticky Ixiolaena)*			
888.		*Ixodes australiensis*			
889.	4012	*Jacksonia furcellata (Grey Stinkwood)*			
890.	4029	*Jacksonia sternbergiana (Stinkwood, Kapur)*			
891.	1178	*Juncus bufonius (Toad Rush)*	Y		
892.	1186	*Juncus microcephalus*	Y		
893.	1188	*Juncus pallidus (Pale Rush)*			
894.	1190	*Juncus planifolius (Broadleaf Rush)*			
895.		*Kangarosa properipes*			
896.	4037	*Kennedia coccinea (Coral Vine)*			
897.	4044	*Kennedia prostrata (Scarlet Runner)*			
898.	5832	*Kunzea ericifolia (Spearwood, Pondil)*			
899.	15498	*Kunzea glabrescens (Spearwood)*			
900.	48837	*Laccocephalum mylittae*			
901.	13562	*Lachenalia aloides*	Y		
902.	1370	*Lachenalia reflexa*	Y		
903.	20019	*Lachnagrostis filiformis*			
904.	6777	*Lachnostachys albicans*			
905.	38803	*Lachnum virgineum*			
906.	8096	*Lactuca serriola (Prickly Lettuce)*	Y		
907.	18585	*Lagenophora huegelii*			
908.	14646	*Lagunaria patersonia*	Y		
909.	467	*Lagurus ovatus (Hare's Tail Grass)*	Y		
910.		*Lampona cylindrata*			
911.	6733	*Lantana camara (Common Lantana)*	Y		
912.	25637	*Larus novaehollandiae (Silver Gull)*			
913.	24511	*Larus novaehollandiae subsp. novaehollandiae (Silver Gull)*			
914.	4052	*Latrobea tenella*			
915.		*Latrodectus hasseltii*			
916.	4958	*Lawrencia spicata*			
917.	1307	*Laxmannia ramosa (Branching Lily)*			
918.	11911	*Laxmannia ramosa subsp. ramosa*			
919.	11464	*Laxmannia sessiliflora subsp. australis*			
920.		*Laxmannia sp.*			
921.	1309	*Laxmannia squarrosa*			
922.	7572	*Lechenaultia expansa*			
923.	7574	*Lechenaultia floribunda (Free-flowering Leschenaultia)*			
924.		*Lecidea sp.*			
925.	1051	*Lemna disperma (Duckweed)*			
926.	39038	*Leocarpus fragilis*			
927.	44490	*Leontodon rhagadioloides*	Y		
928.	8099	*Leontodon saxatilis (Hairy Hawkbit)*	Y		
929.		*Lepidosperma ?sp. Brixton Street broad inflorescence*			Y
930.		*Lepidosperma ?sp. Darling Scarp*			Y
931.		*Lepidosperma aff. Brixton Street*			Y
932.	925	*Lepidosperma angustatum*			
933.	937	*Lepidosperma longitudinale (Pithy Sword-sedge)*			
934.	45753	*Lepidosperma oldhamii (Oldham's Sword Sedge)*			
935.	940	*Lepidosperma pubisquameum*			
936.		*Lepidosperma pubisquameum "flat form"*			
937.	41649	*Lepidosperma rigidulum*			

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938.	944	*Lepidosperma scabrum*			
939.		*Lepidosperma sp.*			
940.		*Lepidosperma sp. Brixton Street broad inflorescence*			
941.		*Lepidosperma sp. Brixton Street narrow inflorescence*			
942.		*Lepidosperma sp. Darling Scarp*			
943.	29150	*Lepidosperma sp. Margaret River (B.J. Lepschi 1841)*			
944.		*Lepidosperma sp. inland scabrum*			Y
945.		*Lepidosperma sp. terete*			Y
946.	945	*Lepidosperma squamatum*			
947.		*Lepidosperma squamatum s.l.*			
948.	1653	*Leporella fimbriata (Hare Orchid)*			
949.	1077	*Leptocarpus canus (Hoary Twine-rush)*			
950.	1078	*Leptocarpus coangustatus*			
951.	46375	*Leptocarpus decipiens*			
952.	19833	*Leptocarpus laxus*			
953.	46382	*Leptocarpus roycei*			
954.	1080	*Leptocarpus scariosus*			
955.	46383	*Leptocarpus tephrinus*			
956.	15418	*Leptoceras menziesii*			
957.	2342	*Leptomeria cunninghamii*			
958.	2344	*Leptomeria empetriformis*			
959.	2350	*Leptomeria pauciflora (Sparse-flowered Currant Bush)*			
960.	2352	*Leptomeria preissiana*			
961.	5847	*Leptospermum erubescens (Roadside Teatree)*			
962.	5850	*Leptospermum laevigatum (Coast Teatree)*	Y		
963.	25128	*Lerista christinae*			
964.	25131	*Lerista distinguenda*			
965.	25133	*Lerista elegans*			
966.	6360	*Leucopogon australis (Spiked Beard-heath)*			
967.	6374	*Leucopogon conostephioides*			
968.	6425	*Leucopogon oxycedrus*			
969.	6427	*Leucopogon parviflorus (Coast Beard-heath)*			
970.	6434	*Leucopogon polymorphus*			
971.	6436	*Leucopogon propinquus*			
972.	6440	*Leucopogon racemulosus*			
973.	40803	*Leucopogon squarrosus subsp. squarrosus*			
974.	6451	*Leucopogon tenuis*			
975.		*Levenhookia ?pusilla*			Y
976.	7674	*Levenhookia preissii (Preiss's Stylewort)*			
977.	7676	*Levenhookia pusilla (Midget Stylewort)*			
978.		*Levenhookia pusilla/stipitata*			
979.	7677	*Levenhookia stipitata (Common Stylewort)*			
980.	25005	*Lialis burtonis*			
981.	39042	*Licea minima*			
982.	39046	*Licea rufocuprea*			Y
983.	31280	*Lichenomphalia chromacea*			
984.	25661	*Lichmera indistincta (Brown Honeyeater)*			
985.	24582	*Lichmera indistincta subsp. indistincta (Brown Honeyeater)*			
986.	38808	*Limacella pitereka*			
987.	25415	*Limnodynastes dorsalis (Western Banjo Frog)*			
988.	36179	*Liparophyllum violifolium*			
989.	25378	*Litoria adelaidensis (Slender Tree Frog)*			
990.	25388	*Litoria moorei (Motorbike Frog)*			
991.	9289	*Lobelia anceps (Angled Lobelia)*			
992.	7408	*Lobelia tenuior (Slender Lobelia)*			
993.	6515	*Logania vaginalis (White Spray)*			
994.	10957	*Lolium perenne x rigidum*	Y		
995.	478	*Lolium rigidum (Wimmera Ryegrass)*	Y		
996.		*Lolium sp. (annual)*			
997.		*Lomandra ?caespitosa*			
998.		*Lomandra ?hermaphrodita*			Y
999.		*Lomandra ?nigricans*			Y
1000.		*Lomandra ?preissii*			
1001.		*Lomandra ?suaveolens*			Y
1002.	1223	*Lomandra caespitosa (Tufted Mat Rush)*			
1003.		*Lomandra caespitosa/suaveolens*			Y
1004.	1228	*Lomandra hermaphrodita*			
1005.	1231	*Lomandra maritima*			
1006.	14542	*Lomandra micrantha subsp. micrantha*			
1007.	1234	*Lomandra nigricans*			

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1008.	1236	*Lomandra odora (Tiered Matrush)*			
1009.	1239	*Lomandra preissii*			
1010.	1243	*Lomandra sericea (Silky Mat Rush)*			
1011.		*Lomandra sp.*			
1012.	1246	*Lomandra suaveolens*			
1013.	25683	*Lonchura castaneothorax (Chestnut-breasted Mannikin)*			
1014.		*Longepi woodman*			
1015.		*Lophoictinia isura*			
1016.	8564	*Lotus subbiflorus*	Y		
1017.	4063	*Lotus uliginosus (Greater Lotus)*	Y		
1018.	4065	*Lupinus angustifolius (Narrowleaf Lupin)*	Y		
1019.	4066	*Lupinus cosentinii*	Y		
1020.	1198	*Luzula meridionalis (Field Woodrush)*			
1021.	6968	*Lycium ferocissimum (African Boxthorn)*	Y		
1022.	39048	*Lycogala epidendrum*			
1023.		*Lycosa ariadnae*			
1024.		*Lycosa australicola*			
1025.		*Lycosa gilberta*			
1026.		*Lycosa lacertosa*			
1027.	1097	*Lyginia barbata*			
1028.		*Lyginia barbata/imberbis*			
1029.	18049	*Lyginia imberbis*			
1030.	1656	*Lyperanthus serratus (Rattle Beak Orchid)*			
1031.	36375	*Lysimachia arvensis (Pimpernel)*	Y		
1032.	6456	*Lysinema ciliatum (Curry Flower)*			
1033.	6458	*Lysinema elegans*			
1034.	34736	*Lysinema pentapetalum*			
1035.	5281	*Lythrum hyssopifolia (Lesser Loosestrife)*	Y		
1036.	2838	*Macarthuria apetala*			
1037.	2839	*Macarthuria australis*			
1038.	24132	*Macropus fuliginosus (Western Grey Kangaroo)*			
1039.	18119	*Macrozamia fraseri*			
1040.	85	*Macrozamia riedlei (Zamia, Djiridji)*			
1041.	24326	*Malacorhynchus membranaceus (Pink-eared Duck)*			
1042.	25651	*Malurus lamberti (Variegated Fairy-wren)*			
1043.	25654	*Malurus splendens (Splendid Fairy-wren)*			
1044.	36480	*Malva arborea (Tree Mallow)*	Y		
1045.	36522	*Malva pseudolavatera*	Y		
1046.		*Maratus pavonis*			
1047.		*Marchantia berteroana*			
1048.	4075	*Medicago littoralis (Strand Medic)*	Y		
1049.	4077	*Medicago minima (Small Burr Medic)*	Y		
1050.	4079	*Medicago polymorpha (Burr Medic)*	Y		
1051.	4080	*Medicago sativa (Alfalfa)*	Y		
1052.	25758	*Megalurus gramineus (Little Grassbird)*			
1053.	34676	*Meionectes brownii (Swamp Raspwort)*			
1054.		*Melaleuca ?thymoides*			Y
1055.	5881	*Melaleuca brevifolia*			
1056.	5900	*Melaleuca cuticularis (Saltwater Paperbark)*			
1057.	5920	*Melaleuca huegelii (Chenille Honeymyrtle)*			
1058.	13271	*Melaleuca huegelii subsp. huegelii*			
1059.	5921	*Melaleuca incana (Grey Honeymyrtle)*			
1060.	13273	*Melaleuca incana subsp. incana*			
1061.	5922	*Melaleuca lanceolata (Rottnest Teatree, Moonah)*			
1062.	5926	*Melaleuca lateritia (Robin Redbreast Bush)*			
1063.	5946	*Melaleuca pauciflora*			
1064.	5952	*Melaleuca preissiana (Moonah)*			
1065.	5959	*Melaleuca rhaphiophylla (Swamp Paperbark)*			
1066.	5964	*Melaleuca seriata*			
1067.	18598	*Melaleuca systena*			
1068.	5978	*Melaleuca teretifolia (Banbar)*			
1069.	5980	*Melaleuca thymoides*			
1070.	5983	*Melaleuca trichophylla*			
1071.	5987	*Melaleuca viminea (Mohan)*			
1072.	47997	*Melanodryas cucullata (Hooded Robin)*			
1073.	4085	*Melilotus indicus*	Y		
1074.	25663	*Melithreptus brevirostris (Brown-headed Honeyeater)*			
1075.	24587	*Melithreptus chloropsis (Western White-naped Honeyeater)*			
1076.	24736	*Melopsittacus undulatus (Budgerigar)*			
1077.	25184	*Menetia greyii*			

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1078.	3050	*Menkea australis (Fairy Spectacles)*			
1079.	6884	*Mentha spicata (Spearmint)*	Y		
1080.	24598	*Merops ornatus (Rainbow Bee-eater)*			
1081.	953	*Mesomelaena graciliceps*			
1082.	955	*Mesomelaena pseudostygia*			
1083.	957	*Mesomelaena tetragona (Semaphore Sedge)*			
1084.		*Microcarbo melanoleucos*			
1085.	25693	*Microeca fascinans (Jacky Winter)*			
1086.	485	*Microlaena stipoides (Weeping Grass)*			
1087.	1658	*Microtis atrata (Swamp Mignonette Orchid)*			
1088.	8814	*Microtis brownii*			
1089.	31713	*Microtis cupularis*			
1090.	10954	*Microtis media (Tall Mignonette Orchid)*			
1091.	15419	*Microtis media subsp. media*			
1092.	8106	*Millotia tenuifolia (Soft Millotia)*			
1093.	14344	*Millotia tenuifolia var. tenuifolia (Soft Millotia)*			
1094.	25542	*Milvus migrans (Black Kite)*			
1095.	16693	*Minuartia mediterranea*	Y		
1096.		*Missulena granulosa*			
1097.		*Missulena occatoria*			
1098.		*Mituliodon tarantulinus*			
1099.		*Mitzoruga insularis*			
1100.		*Molycria vokes*			
1101.	37440	*Monopsis debilis var. depressa*	Y		
1102.	4666	*Monotaxis occidentalis*			
1103.	19179	*Moraea flaccida (One-leaf Cape Tulip)*	Y		
1104.	19438	*Moraea ochroleuca*	Y		
1105.	25191	*Morethia lineoocellata*			
1106.	25192	*Morethia obscura*			
1107.	48008	*Morus serrator (Australasian Gannet)*			
1108.	2412	*Muehlenbeckia adpressa (Climbing Lignum)*			
1109.	24223	*Mus musculus (House Mouse)*	Y		
1110.	20774	*Musa acuminata*	Y		
1111.	24042	*Mustela putorius (European Polecat, Ferret)*	Y		
1112.		*Myandra bicincta*			
1113.		*Mycena carmeliana*			
1114.		*Mycena nargan*			
1115.	25420	*Myobatrachus gouldii (Turtle Frog)*			
1116.	7291	*Myoporum insulare (Blueberry Tree, boobialla)*			
1117.	14187	*Myriocephalus occidentalis*			
1118.	6189	*Myriophyllum crispatum*			
1119.	6198	*Myriophyllum salsugineum*			
1120.	6199	*Myriophyllum tillaeoides*			
1121.		*Myrtaceae sp.*			Y
1122.		*Nanometa gentilis*			
1123.	25248	*Neelaps bimaculatus (Black-naped Snake)*			
1124.	24738	*Neophema elegans (Elegant Parrot)*			
1125.	24739	*Neophema petrophila (Rock Parrot)*			
1126.		*Nephila edulis*			
1127.		*Nicodamus mainae*			
1128.	6974	*Nicotiana glauca (Tree Tobacco)*	Y		
1129.		*Nidula emodensis*			
1130.	25747	*Ninox connivens (Barking Owl)*			
1131.	25252	*Notechis scutatus (Tiger Snake)*			
1132.		*Notiasemus glauerti*			
1133.	2401	*Nuytsia floribunda (Christmas Tree, Mudja)*			
1134.	25564	*Nycticorax caledonicus (Rufous Night Heron)*			
1135.	24194	*Nyctophilus geoffroyi (Lesser Long-eared Bat)*			
1136.	24407	*Ocyphaps lophotes (Crested Pigeon)*			
1137.		*Oecobius navus*			
1138.	6138	*Oenothera drummondii (Beach Evening Primrose)*	Y		
1139.	14293	*Oenothera indecora subsp. bonariensis*	Y		
1140.	20052	*Oenothera jamesii*	Y		
1141.	16347	*Oenothera laciniata*	Y		
1142.	6140	*Oenothera mollissima*	Y		
1143.	14292	*Oenothera stricta subsp. stricta*	Y		
1144.	8127	*Olearia axillaris (Coastal Daisybush)*			
1145.	8149	*Olearia rudis (Rough Daisybush)*			
1146.	39054	*Oligonema schweinitzii*			
1147.		*Olpidium brassicae*			Y

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1148.	18255	*Opercularia vaginata (Dog Weed)*			
1149.	12782	*Ophioglossum gramineum*			
1150.	36177	*Ornduffia albiflora*			
1151.	1372	*Ornithogalum arabicum (Lesser Cape Lily)*	Y		
1152.	4113	*Ornithopus compressus (Yellow Serradella)*	Y		
1153.	7122	*Orobanche minor (Lesser Broomrape)*	Y		
1154.	24085	*Oryctolagus cuniculus (Rabbit)*	Y		
1155.	17756	*Osteospermum ecklonis*	Y		
1156.	168	*Ottelia ovalifolia (Swamp Lily)*			
1157.	4356	*Oxalis pes-caprae (Soursob)*	Y		
1158.	25680	*Pachycephala rufiventris (Rufous Whistler)*			
1159.	44860	*Pancratium maritimum*	Y		Y
1160.		*Paralamyctes cammooensis*			Y
1161.	25253	*Parasuta gouldii*			
1162.	25681	*Pardalotus punctatus (Spotted Pardalote)*			
1163.	25682	*Pardalotus striatus (Striated Pardalote)*			
1164.	34481	*Parthenocissus quinquefolia*	Y		
1165.	527	*Paspalum dilatatum*	Y		
1166.	532	*Paspalum urvillei (Vasey Grass)*	Y		
1167.	24642	*Passer montanus (Eurasian Tree Sparrow)*	Y		
1168.	1550	*Patersonia occidentalis (Purple Flag, Koma)*			
1169.	30471	*Patersonia occidentalis var. angustifolia*			
1170.	30472	*Patersonia occidentalis var. occidentalis*			
1171.		*Pediana occidentalis*			
1172.		*Pelargonium ?littorale*			Y
1173.	4343	*Pelargonium capitatum (Rose Pelargonium)*	Y		
1174.	4346	*Pelargonium littorale*			
1175.		*Pelates sexlineatus*			
1176.	24648	*Pelecanus conspicillatus (Australian Pelican)*			
1177.	27121	*Penicillus nodulosus*			
1178.	6006	*Pericalymma ellipticum (Swamp Teatree)*			
1179.	16477	*Pericalymma ellipticum var. ellipticum*			
1180.	16478	*Pericalymma ellipticum var. floridum*			
1181.	39057	*Perichaena corticalis*			
1182.	39058	*Perichaena depressa*			
1183.	13911	*Persicaria decipiens*			
1184.	11020	*Persicaria hydropiper*			
1185.	16983	*Persicaria maculosa*	Y		
1186.	2273	*Persoonia saccata (Snottygobble)*			
1187.	48060	*Petrochelidon ariel (Fairy Martin)*			
1188.	48061	*Petrochelidon nigricans (Tree Martin)*			
1189.	48066	*Petroica boodang (Scarlet Robin)*			
1190.	24659	*Petroica goodenovii (Red-capped Robin)*			
1191.	20368	*Petrophile axillaris*			
1192.	2299	*Petrophile linearis (Pixie Mops)*			
1193.	2301	*Petrophile macrostachya*			
1194.	2309	*Petrophile serruriae*			
1195.	2312	*Petrophile striata*			
1196.	19825	*Petrorhagia dubia*	Y		
1197.		*Peziza sp.*			
1198.	25697	*Phalacrocorax carbo (Great Cormorant)*			
1199.	24665	*Phalacrocorax fuscescens (Black-faced Cormorant)*			
1200.	25698	*Phalacrocorax melanoleucos (Little Pied Cormorant)*			
1201.	24667	*Phalacrocorax sulcirostris (Little Black Cormorant)*			
1202.	25699	*Phalacrocorax varius (Pied Cormorant)*			
1203.	11494	*Phalaris arundinacea var. arundinacea*	Y		
1204.	24409	*Phaps chalcoptera (Common Bronzewing)*			
1205.	25587	*Phaps elegans (Brush Bronzewing)*			
1206.	20460	*Pheladenia deformis*			
1207.		*Phellinus gilvus*			
1208.		*Phenasteron longiconductor*			
1209.	18529	*Philotheca spicata (Pepper and Salt)*			
1210.	1478	*Phlebocarya ciliata*			
1211.	1479	*Phlebocarya filifolia*			
1212.		*Phlebocarya sp.*			
1213.		*Pholiota communis*			
1214.	48071	*Phylidonyris niger (White-cheeked Honeyeater)*			
1215.	24596	*Phylidonyris novaehollandiae (New Holland Honeyeater)*			
1216.	16177	*Phyllangium paradoxum*			
1217.	4675	*Phyllanthus calycinus (False Boronia)*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1218.	4	*Phylloglossum drummondii (Pigmy Clubmoss)*			
1219.	4141	*Phyllota gracilis*			
1220.	6984	*Physalis philadelphica (Tomatillo)*	Y		Y
1221.	39061	*Physarum bitectum*			
1222.	39062	*Physarum bivalve*			
1223.	39063	*Physarum cinereum*			
1224.	39064	*Physarum citrinum*			Y
1225.	39065	*Physarum compressum*			
1226.	39069	*Physarum famintzinii*			Y
1227.	39072	*Physarum melleum*			
1228.	44062	*Physarum polycephalum*			
1229.	39074	*Physarum pusillum*			
1230.	39076	*Physarum sessile*			
1231.	39078	*Physarum vernum*			
1232.	39079	*Physarum viride*			
1233.	2793	*Phytolacca octandra (Red Ink Plant)*	Y		
1234.		*Phytophthora cinnamomi*			
1235.	49071	*Picipes badius*			
1236.	5243	*Pimelea ferruginea*			
1237.	11402	*Pimelea imbricata var. piligera*			
1238.	5254	*Pimelea leucantha*			
1239.	18117	*Pimelea rosea subsp. rosea*			
1240.	12041	*Pimelea suaveolens subsp. suaveolens*			
1241.	5268	*Pimelea sulphurea (Yellow Banjine)*			
1242.		*Pinkfloydia harveii*			
1243.	17671	*Pinus halepensis*	Y		
1244.	88	*Pinus radiata (Radiata Pine)*	Y		
1245.		*Piona cumberlandensis*			
1246.		*Pisolithus sp.*			
1247.	42281	*Pithocarpa cordata*			
1248.	8165	*Pithocarpa pulchella (Beautiful Pithocarpa)*			
1249.	18353	*Pithocarpa pulchella var. pulchella*			
1250.	7304	*Plantago major (Greater Plantain)*	Y		
1251.	24841	*Platalea flavipes (Yellow-billed Spoonbill)*			
1252.	24842	*Platalea regia (Royal Spoonbill)*			
1253.	25720	*Platycercus icterotis (Western Rosella)*			
1254.	24747	*Platycercus spurius (Red-capped Parrot)*			
1255.	25721	*Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)*			
1256.	24750	*Platycercus zonarius subsp. semitorquatus (Twenty-eight Parrot)*			
1257.	6249	*Platysace compressa (Tapeworm Plant)*			
1258.	6253	*Platysace filiformis*			
1259.	4524	*Platytheca galioides*			
1260.	25509	*Pletholax gracilis (Keeled Legless Lizard)*			
1261.	25007	*Pletholax gracilis subsp. gracilis (Keeled Legless Lizard)*			
1262.	38823	*Pleuroflammula praestans*			
1263.	38825	*Pluteus pauperculus*			
1264.	571	*Poa annua (Winter Grass)*	Y		
1265.	578	*Poa porphyroclados*			
1266.		*Poaceae sp.*			
1267.	25703	*Podargus strigoides (Tawny Frogmouth)*			
1268.	25704	*Podiceps cristatus (Great Crested Grebe)*			
1269.	8175	*Podolepis gracilis (Slender Podolepis)*			
1270.		*Podotheca ?chrysantha*			Y
1271.		*Podotheca ?gnaphalioides*			
1272.	8182	*Podotheca angustifolia (Sticky Longheads)*			
1273.		*Podotheca angustifolia/gnaphalioides*			Y
1274.	8183	*Podotheca chrysantha (Yellow Podotheca)*			
1275.	8184	*Podotheca gnaphalioides (Golden Long-heads)*			
1276.		*Podotheca sp.*			
1277.		*Podykipus collinus*			
1278.	25510	*Pogona minor (Dwarf Bearded Dragon)*			
1279.	24907	*Pogona minor subsp. minor (Dwarf Bearded Dragon)*			
1280.	24681	*Poliocephalus poliocephalus (Hoary-headed Grebe)*			
1281.		*Poltys laciniosus*			
1282.	2905	*Polycarpon tetraphyllum (Fourleaf Allseed)*	Y		
1283.	582	*Polypogon monspeliensis (Annual Beardgrass)*	Y		
1284.	25722	*Polytelis anthopeplus (Regent Parrot)*			
1285.	4691	*Poranthera microphylla (Small Poranthera)*			
1286.		*Poranthera microphylla/moorokatta*			
1287.	44729	*Porostereum crassum*			

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1288.	25731	*Porphyrio porphyrio (Purple Swamphen)*			
1289.	24767	*Porphyrio porphyrio subsp. bellus (Purple Swamphen)*			
1290.	24769	*Porzana fluminea (Australian Spotted Crake)*			
1291.	25732	*Porzana pusilla (Baillon's Crake)*			
1292.	24770	*Porzana pusilla subsp. palustris (Baillon's Crake)*			
1293.	24771	*Porzana tabuensis (Spotless Crake)*			
1294.	1670	*Prasophyllum drummondii (Swamp Leek Orchid)*			
1295.	1672	*Prasophyllum fimbria (Fringed Leek Orchid)*			
1296.	1673	*Prasophyllum gibbosum (Humped Leek Orchid)*			
1297.	1674	*Prasophyllum giganteum (Bronze Leek Orchid)*			
1298.	1676	*Prasophyllum hians (Yawning Leek Orchid)*			
1299.	1677	*Prasophyllum macrostachyum (Laughing Leek Orchid)*			
1300.	10853	*Prasophyllum plumiforme*			
1301.	1681	*Prasophyllum regium (King Leek Orchid)*			
1302.		*Prionosternum scutatum*			
1303.		*Psathyrella candolleana*			
1304.	8189	*Pseudognaphalium luteoalbum (Jersey Cudweed)*			
1305.		*Pseudolampona woodman*			
1306.	25511	*Pseudonaja affinis (Dugite)*			
1307.	25259	*Pseudonaja affinis subsp. affinis (Dugite)*			
1308.	25433	*Pseudophryne guentheri (Crawling Toadlet)*			
1309.		*Pterostylis ?sanguinea*			Y
1310.		*Pterostylis aff. nana*			
1311.		*Pterostylis aff. nana ?short sepal*			Y
1312.	15426	*Pterostylis aspera*			
1313.	48677	*Pterostylis ectypha*			
1314.	44723	*Pterostylis glebosa*			
1315.		*Pterostylis nana "short sepal"*			
1316.	1693	*Pterostylis recurva (Jug Orchid)*			
1317.	12217	*Pterostylis sanguinea*			
1318.		*Pterostylis sp.*			
1319.	18655	*Pterostylis sp. crinkled leaf (G.J. Keighery 13426)*			
1320.	1698	*Pterostylis vittata (Banded Greenhood)*			
1321.		*Pterygotrigla polyommata*			
1322.	2718	*Ptilotus drummondii (Narrowleaf Mulla Mulla)*			
1323.	11260	*Ptilotus drummondii var. drummondii (Pussytail)*			
1324.	2742	*Ptilotus manglesii (Pom Poms, Mulamula)*			
1325.	2751	*Ptilotus polystachyus (Prince of Wales Feather)*			
1326.	15856	*Ptilotus sericostachyus subsp. sericostachyus*			
1327.	24711	*Puffinus assimilis subsp. assimilis (Little Shearwater)*			
1328.	4177	*Pultenaea ochreata*			
1329.	4181	*Pultenaea reticulata*			
1330.		*Purpureicephalus spurius*			
1331.	48835	*Pycnoporus coccineus*			
1332.	48833	*Pycnoporus sanguineus*			
1333.	25008	*Pygopus lepidopodus (Common Scaly Foot)*			
1334.	16367	*Pyrorchis nigricans (Red beaks, Elephants ears)*			
1335.	8195	*Quinetia urvillei*			
1336.	2938	*Ranunculus trilobus (Buttercup)*	Y		
1337.	24243	*Rattus fuscipes (Western Bush Rat)*			
1338.	24244	*Rattus norvegicus (Brown Rat)*	Y		
1339.	24245	*Rattus rattus (Black Rat)*	Y		
1340.		*Raveniella arenacea*			
1341.		*Raveniella cirrata*			
1342.		*Raveniella peckorum*			
1343.		*Raveniella subcirrata*			
1344.	24776	*Recurvirostra novaehollandiae (Red-necked Avocet)*			
1345.	6012	*Regelia ciliata*			
1346.	6014	*Regelia inops*			
1347.	8197	*Reichardia tingitana (False Sowthistle)*	Y		
1348.	3084	*Reseda lutea (Cutleaf Mingnonette)*	Y		
1349.	3085	*Reseda luteola (Wild Mingnonette)*	Y		
1350.	38832	*Resupinatus cinerascens*			
1351.	39081	*Reticularia lycoperdon*			
1352.	39082	*Reticularia olivacea*			Y
1353.	11341	*Rhagodia baccata subsp. baccata*			
1354.	4822	*Rhamnus alaternus (Buckthorn)*	Y		
1355.	48096	*Rhipidura albiscapa (Grey Fantail)*			
1356.	25614	*Rhipidura leucophrys (Willie Wagtail)*			
1357.	13300	*Rhodanthe citrina*			

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1358.	14485	*Romulea flava var. minor*	Y		
1359.	1556	*Romulea rosea (Guildford Grass)*	Y		
1360.	14924	*Romulea rosea var. communis*	Y		
1361.	10970	*Rostraria cristata*	Y		
1362.	44608	*Rosulabryum billarderii*			
1363.	2429	*Rumex acetosella (Sorrel)*	Y		
1364.	2433	*Rumex crispus (Curled Dock)*	Y		
1365.	116	*Ruppia polycarpa*			
1366.	40425	*Rytidosperma caespitosum*			
1367.	40426	*Rytidosperma occidentale*			
1368.	2906	*Sagina apetala (Annual Pearlwort)*	Y		
1369.	2908	*Sagina maritima*	Y		
1370.	2907	*Sagina procumbens (Spreading Pearlwort)*	Y		
1371.	48430	*Salicornia quinqueflora*			
1372.	6929	*Salvia verbenaca (Wild Sage)*	Y		
1373.	6483	*Samolus junceus*			
1374.	6484	*Samolus repens (Creeping Brookweed)*			
1375.	11647	*Samolus repens var. repens*			
1376.	2356	*Santalum acuminatum (Quandong, Warnga)*			
1377.	7368	*Scabiosa atropurpurea (Purple Pincushion)*	Y		
1378.	7595	*Scaevola anchusifolia*			
1379.	7603	*Scaevola canescens (Grey Scaevola)*			
1380.	7626	*Scaevola nitida (Shining Fanflower)*			
1381.	13182	*Scaevola repens var. repens*			
1382.	13152	*Scaevola thesioides subsp. thesioides*			
1383.	48834	*Schinus terebinthifolia*	Y		
1384.	978	*Schoenus brevisetis*			
1385.	979	*Schoenus caespititius*			
1386.	982	*Schoenus clandestinus*			
1387.	984	*Schoenus curvifolius*			
1388.	986	*Schoenus efoliatus*			
1389.	992	*Schoenus grandiflorus (Large Flowered Bogrush)*			
1390.	17614	*Schoenus plumosus*			
1391.	1011	*Schoenus rigens*			
1392.	1017	*Schoenus subbulbosus*			
1393.	16251	*Schoenus subflavus subsp. long leaves (K.L. Wilson 2865)*			
1394.	6033	*Scholtzia involucrata (Spiked Scholtzia)*			
1395.		*Scleroderma cepa*			
1396.		*Scolopendra laeta*			
1397.	603	*Secale cereale (Rye)*	Y		
1398.	6	*Selaginella gracillima (Tiny Clubmoss)*			
1399.	25878	*Senecio condylus*			
1400.		*Senecio diaschides/glomeratus*			Y
1401.	20663	*Senecio multicaulis subsp. multicaulis*			
1402.	20161	*Senecio pinnatifolius*			
1403.	25884	*Senecio pinnatifolius var. latilobus*			
1404.	8220	*Senecio vulgaris (Common Groundsel)*	Y		
1405.	25534	*Sericornis frontalis (White-browed Scrubwren)*			
1406.		*Servaea melaina*			
1407.	19453	*Setaria parviflora*	Y		
1408.		*Silene armeria*			Y
1409.	2909	*Silene gallica (French Catchfly)*	Y		
1410.	15972	*Silene gallica var. gallica*	Y		
1411.		*Sillago burrus*			
1412.	8225	*Siloxerus humifusus (Procumbent Siloxerus)*			
1413.		*Simaetha tenuior*			
1414.	25266	*Simoselaps bertholdi (Jan's Banded Snake)*			
1415.	48862	*Sisyrinchium rosulatum*	Y		
1416.		*Smeringopus natalensis*			
1417.	30948	*Smicrornis brevirostris (Weebill)*			
1418.		*Solaenodolichopus pruvoti*			
1419.	6988	*Solanum americanum (Glossy Nightshade)*	Y		
1420.	7020	*Solanum linnaeanum (Apple of Sodom)*	Y		
1421.	7022	*Solanum nigrum (Black Berry Nightshade)*	Y		
1422.	7025	*Solanum oldfieldii*			
1423.	7037	*Solanum symonii*			
1424.	45036	*Solidago chilensis*	Y		
1425.	8230	*Sonchus asper (Rough Sowthistle)*	Y		
1426.	9367	*Sonchus hydrophilus (Native Sowthistle)*			
1427.	8231	*Sonchus oleraceus (Common Sowthistle)*	Y		

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1428.	1312	*Sowerbaea laxiflora (Purple Tassels)*			
1429.	1558	*Sparaxis bulbifera*	Y		
1430.	1560	*Sparaxis pillansii (Harlequin Flower)*	Y		
1431.	4205	*Sphaerolobium linophyllum*			
1432.	4211	*Sphaerolobium vimineum (Leafless Globe Pea)*			
1433.	627	*Spinifex x alterniflorus*			
1434.	635	*Sporobolus virginicus (Marine Couch)*			
1435.	4828	*Spyridium globulosum (Basket Bush)*			
1436.	9069	*Stackhousia huegelii*			
1437.		*Steatoda capensis*			
1438.	2918	*Stellaria media (Chickweed)*	Y		
1439.	39083	*Stemonitis fusca*			
1440.	39088	*Stemonitis virginiensis*			
1441.	39090	*Stemonitopsis gracilis*			
1442.	19403	*Stenopetalum gracile*			
1443.	636	*Stenotaphrum secundatum (Buffalo Grass)*	Y		
1444.	24528	*Sterna hybrida subsp. javanica (Whiskered Tern)*			
1445.	48594	*Sternula nereis (Fairy Tern)*			
1446.	24329	*Stictonetta naevosa (Freckled Duck)*			
1447.		*Stigmatopora argus*			
1448.	2316	*Stirlingia latifolia (Blueboy)*			
1449.	25597	*Strepera versicolor (Grey Currawong)*			
1450.	25589	*Streptopelia chinensis (Spotted Turtle-Dove)*	Y		
1451.	25590	*Streptopelia senegalensis (Laughing Turtle-Dove)*	Y		
1452.	25518	*Strophurus spinigerus*			
1453.	24942	*Strophurus spinigerus subsp. spinigerus*			
1454.	24946	*Strophurus strophurus*			
1455.	44492	*Stuckenia pectinata*			
1456.		*Stylidium ?araeophyllum*			Y
1457.	25831	*Stylidium araeophyllum (Stilt Walker)*			
1458.		*Stylidium araeophyllum/neurophyllum*			
1459.	7693	*Stylidium brunonianum (Pink Fountain Triggerplant)*			
1460.	7694	*Stylidium bulbiferum (Circus Triggerplant)*			
1461.	7696	*Stylidium calcaratum (Book Triggerplant)*			
1462.	7699	*Stylidium carnosum (Fleshy-leaved Triggerplant)*			
1463.	25801	*Stylidium hesperium*			
1464.	25829	*Stylidium neurophyllum (Coastal Plain Triggerplant)*			
1465.	7774	*Stylidium piliferum (Common Butterfly Triggerplant)*			
1466.	7777	*Stylidium preissii (Lizard Triggerplant)*			
1467.	7785	*Stylidium repens (Matted Triggerplant)*			
1468.	25806	*Stylidium scariosum*			
1469.	7798	*Stylidium schoenoides (Cow Kicks)*			
1470.		*Stylidium sp.*			
1471.	1260	*Stypandra glauca (Blind Grass)*			
1472.	2639	*Suaeda australis (Seablite)*			
1473.		*Supunna funerea*			
1474.		*Supunna picta*			
1475.	24259	*Sus scrofa (Pig)*	Y		
1476.	25902	*Symphyotrichum squamatum (Bushy Starwort)*	Y		
1477.	15532	*Synaphea spinulosa subsp. spinulosa*			
1478.		*Synothele michaelseni*			
1479.		*Synothele rastelloides*			
1480.	25705	*Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
1481.	24682	*Tachybaptus novaehollandiae subsp. novaehollandiae (Australasian Grebe, Black-throated Grebe)*			
1482.	24207	*Tachyglossus aculeatus (Short-beaked Echidna)*			
1483.	25552	*Tadorna radjah (Radjah Shelduck)*			
1484.	24331	*Tadorna tadornoides (Australian Shelduck, Mountain Duck)*			
1485.		*Tamopsis darlingtoniana*			
1486.	24167	*Tarsipes rostratus (Honey Possum, Noolbenger)*			
1487.		*Tasmanicosa leuckartii*			
1488.	4256	*Templetonia retusa (Cockies Tongues)*			
1489.	2791	*Tersonia cyathiflora (Button Creeper)*			
1490.		*Tetragnatha demissa*			
1491.		*Tetragnatha nitens*			
1492.	2820	*Tetragonia decumbens (Sea Spinach)*	Y		
1493.	1036	*Tetraria octandra*			
1494.	48341	*Tetratheca hirsuta subsp. viminea*			
1495.		*Thelymitra benthamiana/crinita/fuscolutea*			Y
1496.	1702	*Thelymitra campanulata (Shirt Orchid)*			

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1497.	11143	*Thelymitra graminea*			
1498.	1710	*Thelymitra mucida (Plum Orchid)*			
1499.		*Thelymitra sp.*			
1500.	1716	*Thelymitra tigrina (Tiger Orchid)*			
1501.	5077	*Thomasia cognata*			
1502.	5105	*Thomasia triphylla*			
1503.	2644	*Threlkeldia diffusa (Coast Bonefruit)*			
1504.	24845	*Threskiornis spinicollis (Straw-necked Ibis)*			
1505.		*Thysanotus ?arbuscula*			Y
1506.		*Thysanotus ?manglesianus/patersonii complex*			Y
1507.		*Thysanotus ?thyrsoideus*			
1508.	1318	*Thysanotus arbuscula*			
1509.	1319	*Thysanotus arenarius*			
1510.	1338	*Thysanotus manglesianus (Fringed Lily)*			
1511.		*Thysanotus manglesianus/patersonii complex*			
1512.	1339	*Thysanotus multiflorus (Many-flowered Fringe Lily)*			
1513.	1343	*Thysanotus patersonii*			
1514.		*Thysanotus sp.*			
1515.	1351	*Thysanotus sparteus*			
1516.	1357	*Thysanotus thyrsoideus*			
1517.	1358	*Thysanotus triandrus*			
1518.	25203	*Tiliqua occipitalis (Western Bluetongue)*			
1519.	25519	*Tiliqua rugosa*			
1520.	25204	*Tiliqua rugosa subsp. aspera*			
1521.	25207	*Tiliqua rugosa subsp. rugosa*			
1522.	45838	*Tilletia ehrhartae*			
1523.		*Tinytrema yarra*			
1524.	25549	*Todiramphus sanctus (Sacred Kingfisher)*			
1525.	24309	*Todiramphus sanctus subsp. sanctus (Sacred Kingfisher)*			
1526.		*Torquigener pleurogramma*			
1527.	1368	*Trachyandra divaricata*	Y		
1528.	6280	*Trachymene pilosa (Native Parsnip)*			
1529.	31694	*Tradescantia fluminensis*	Y		Y
1530.		*Tremella mesenterica*			
1531.	48141	*Tribonyx ventralis (Black-tailed Native-hen)*			
1532.	4383	*Tribulus terrestris (Caltrop)*	Y		
1533.	39094	*Trichia affinis*			
1534.	39095	*Trichia botrytis*			
1535.	39096	*Trichia contorta*			
1536.	39097	*Trichia decipiens*			
1537.	39100	*Trichia persimilis*			
1538.	39101	*Trichia varia*			
1539.	39102	*Trichia verrucosa*			
1540.	25723	*Trichoglossus haematodus (Rainbow Lorikeet)*			
1541.	24754	*Trichoglossus haematodus subsp. rubritorquis (Red-collared Lorikeet)*			
1542.	25521	*Trichosurus vulpecula (Common Brushtail Possum)*			
1543.	24158	*Trichosurus vulpecula subsp. vulpecula (Common Brushtail Possum)*			
1544.	1361	*Tricoryne elatior (Yellow Autumn Lily)*			
1545.	1363	*Tricoryne tenella*			
1546.	1038	*Tricostularia neesii*			
1547.		*Trifolium ?campestre*			Y
1548.		*Trifolium ?campestre/dubium*			Y
1549.	4289	*Trifolium angustifolium (Narrowleaf Clover)*	Y		
1550.	17145	*Trifolium angustifolium var. angustifolium*	Y		
1551.	4292	*Trifolium campestre (Hop Clover)*	Y		
1552.	17763	*Trifolium campestre var. campestre (Hop Clover)*	Y		
1553.		*Trifolium campestre/dubium*			
1554.	4293	*Trifolium cernuum (Drooping Flower Clover)*	Y		
1555.	4295	*Trifolium dubium (Suckling Clover)*	Y		
1556.	4298	*Trifolium hirtum (Rose Clover)*	Y		
1557.	14738	*Trifolium resupinatum var. resupinatum*	Y		
1558.	4309	*Trifolium scabrum (Rough Clover)*	Y		
1559.		*Trifolium sp.*			
1560.	4314	*Trifolium suffocatum (Suffocated Clover)*	Y		
1561.	4315	*Trifolium tomentosum (Woolly Clover)*	Y		
1562.	15509	*Trifolium tomentosum var. tomentosum*	Y		
1563.	147	*Triglochin mucronata*			
1564.	4737	*Tripterococcus brunonis (Winged Stackhousia)*			
1565.	4360	*Tropaeolum majus (Garden Nasturtium)*	Y		
1566.	11665	*Trymalium ledifolium var. ledifolium*			

	Name ID	Species Name	Naturalised	Conservation Code	[1]Endemic To Query Area
1567.	39103	*Tubifera ferruginosa*			
1568.	48147	*Turnix varius (Painted Button-quail)*			
1569.	24851	*Turnix velox (Little Button-quail)*			
1570.	24069	*Tursiops truncatus (Bottlenose Dolphin)*			
1571.	98	*Typha domingensis (Bulrush, Djandjid)*			
1572.	24852	*Tyto alba subsp. delicatula (Barn Owl)*			
1573.	27354	*Ulva rigida*			
1574.		*Urochilus sanguineus*			
1575.		*Urodacus novaehollandiae*			
1576.		*Uromycladium tepperianum*			
1577.	8254	*Urospermum picroides (False Hawkbit)*	Y		
1578.	8255	*Ursinia anthemoides (Ursinia)*	Y		
1579.	38388	*Ursinia anthemoides subsp. anthemoides*	Y		
1580.	1767	*Urtica urens (Small Nettle)*	Y		
1581.	7157	*Utricularia violacea (Violet Bladderwort)*			
1582.	25577	*Vanellus miles (Masked Lapwing)*			
1583.	24386	*Vanellus tricolor (Banded Lapwing)*			
1584.	25218	*Varanus gouldii (Bungarra or Sand Monitor)*			
1585.	8257	*Vellereophyton dealbatum (White Cudweed)*	Y		
1586.		*Venator immansueta*			
1587.		*Venatrix pullastra*			
1588.	7108	*Veronica arvensis (Wall Speedwell)*	Y		
1589.	15432	*Verticordia densiflora var. densiflora*			
1590.	6077	*Verticordia drummondii (Drummond's Featherflower)*			
1591.	24206	*Vespadelus regulus (Southern Forest Bat)*			
1592.	4319	*Vicia benghalensis (Purple Vetch)*	Y		
1593.	4320	*Vicia hirsuta (Hairy Vetch)*	Y		
1594.	11474	*Vicia sativa subsp. nigra*	Y		
1595.	4325	*Viminaria juncea (Swishbush, Koweda)*			
1596.	24040	*Vulpes vulpes (Red Fox)*	Y		
1597.	722	*Vulpia bromoides (Squirrel Tail Fescue)*	Y		
1598.	724	*Vulpia myuros (Rat's Tail Fescue)*	Y		
1599.		*Vulpia sp.*			
1600.		*Wahlenbergia ?capensis*			Y
1601.		*Wahlenbergia ?preissii*			Y
1602.	7384	*Wahlenbergia capensis (Cape Bluebell)*	Y		
1603.	7389	*Wahlenbergia preissii*			
1604.		*Wahlenbergia sp.*			
1605.	8282	*Waitzia suaveolens (Fragrant Waitzia)*			
1606.	1567	*Watsonia meriana (Bulbil Watsonia)*	Y		
1607.		*Westrarchaea sinuosa*			
1608.	39104	*Willkommlangea reticulata*			
1609.	6658	*Wilsonia backhousei (Narrow-leaf Wilsonia)*			
1610.	6659	*Wilsonia humilis (Silky Wilsonia)*			
1611.	28194	*Xanthoria parietina*			
1612.	1251	*Xanthorrhoea brunonis*			
1613.	1256	*Xanthorrhoea preissii (Grass tree, Palga)*			
1614.		*Xanthorrhoea sp.*			
1615.	6289	*Xanthosia huegelii*			
1616.	2331	*Xylomelum occidentale (Woody Pear, Djandin)*			
1617.		*Zachria flavicoma*			
1618.	7113	*Zaluzianskya divaricata (Spreading Night Phlox)*	Y		
1619.	1049	*Zantedeschia aethiopica (Arum Lily)*	Y		
1620.	25765	*Zosterops lateralis (Grey-breasted White-eye, Silvereye)*			

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.

Australian Government

Department of Agriculture, Water and the Environment

EPBC Act Protected Matters Report

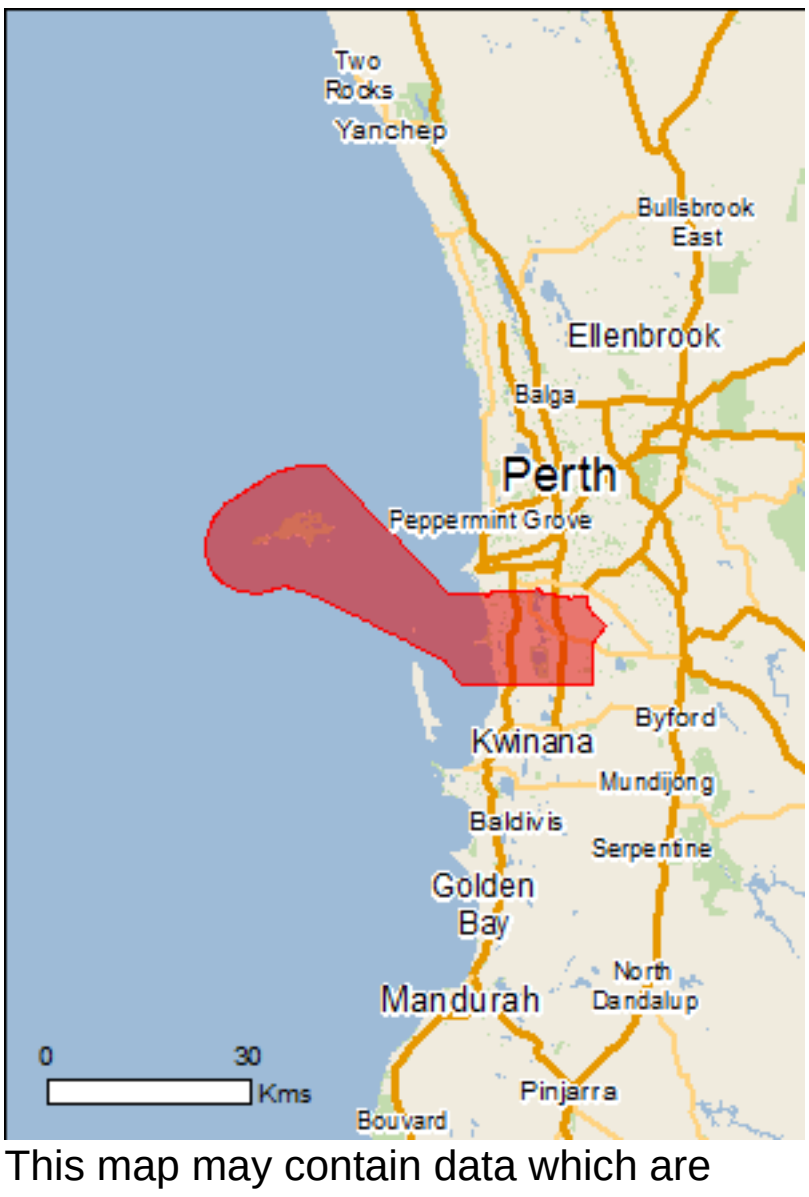
This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

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.

LGA CITY OF COCKBURN, WA

Report created: 10/11/20 12:49:20



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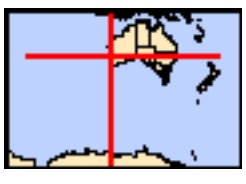

Summary

Matters of National Environment 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 - see http://environment.gov.au/protection/environment-assessments

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	1
Threatened Ecological Communities:	2
Threatened Species:	59
Migratory Species:	74

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. Information on EPBC Act permit requirements and application forms can be found at http://www.environment.gov.au/epbc/permits-and-application-forms

Commonwealth Lands:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	112
Whales and Other Cetaceans:	14
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:	10
Regional Forest Agreements:	None
Invasive Species:	42
Nationally Important Wetlands:	3

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Forrestdale and thomsons lakes	Within Ramsar site

Commonwealth Marine Area [Resource Information]

Approval is required for a proposed activity that is located within the Commonwealth Marine Area which has, will have, or is likely to have a significant impact on the environment. Approval may be required for a proposed action taken outside the Commonwealth Marine Area but which has, may have or is likely to have a significant impact on the environment in the Commonwealth Marine Area.

Name
EEZ and Territorial Sea

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

Threatened Species [Resource Information]

Name	Status	Type of Presence
BIRDS		
Anous tenuirostris melanops		
Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may occur within area
Botaurus poiciloptilus		
Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus		
Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea		
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris		
Great Knot [862]	Critically Endangered	Roosting known to occur within area
Calyptorhynchus banksii naso		
Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area
Calyptorhynchus baudinii		
Baudin's Cockatoo, Long-billed Black-Cockatoo [769]	Endangered	Species or species habitat likely to occur within area
Calyptorhynchus latirostris		
Carnaby's Cockatoo, Short-billed Black-Cockatoo [59523]	Endangered	Species or species habitat known to occur within area
Charadrius leschenaultii		
Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area

Name	Status	Type of Presence
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may

Name	Status	Type of Presence
		occur within area
Thalassarche cauta		
Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida		
Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris		
Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi		
White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
INSECTS		
Hesperocolletes douglasi		
Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area
MAMMALS		
Balaenoptera borealis		
Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus		
Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Dasyurus geoffroii		
Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Breeding known to occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Neophoca cinerea		
Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Pseudocheirus occidentalis		
Western Ringtail Possum, Ngwayir, Womp, Woder, Ngoor, Ngoolangit [25911]	Critically Endangered	Species or species habitat likely to occur within area
Setonix brachyurus		
Quokka [229]	Vulnerable	Species or species habitat known to occur within area
PLANTS		
Andersonia gracilis		
Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area
Caladenia huegelii		
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat known to occur within area
Diuris drummondii		
Tall Donkey Orchid [4365]	Vulnerable	Species or species habitat likely to occur within area
Diuris micrantha		
Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat known to occur within area

Name	Status	Type of Presence
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat likely to occur within area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat known to occur within area
Drakaea micrantha Dwarf Hammer-orchid [56755]	Vulnerable	Species or species habitat likely to occur within area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat may occur within area
Lepidosperma rostratum Beaked Lepidosperma [14152]	Endangered	Species or species habitat may occur within area
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area
REPTILES		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
SHARKS		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat known to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area

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		
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Species or species habitat likely to occur within area
Ardenna pacifica Wedge-tailed Shearwater [84292]		Breeding known to occur within area

Name	Threatened	Type of Presence
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Hydroprogne caspia Caspian Tern [808]		Breeding known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Onychoprion anaethetus Bridled Tern [82845]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Breeding known to occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharhinus longimanus Oceanic Whitetip Shark [84108]		Species or species habitat likely to occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Species or species habitat known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat may occur within area
Manta alfredi Reef Manta Ray, Coastal Manta Ray, Inshore Manta Ray, Prince Alfred's Ray, Resident Manta Ray [84994]		Species or species habitat known to occur within area
Manta birostris Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area

Name	Threatened	Type of Presence
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area

Name	Threatened	Type of Presence
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Thalasseus bergii Crested Tern [83000]		Breeding known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Species or species habitat known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Tringa totanus Common Redshank, Redshank [835]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Lands [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
Anous stolidus Common Noddy [825]		Species or species habitat likely to occur within area
Anous tenuirostris melanops Australian Lesser Noddy [26000]	Vulnerable	Species or species habitat may 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]		Breeding known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris alba Sanderling [875]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris subminuta Long-toed Stint [861]		Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Catharacta skua Great Skua [59472]		Species or species habitat may occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius dubius Little Ringed Plover [896]		Species or species habitat known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea amsterdamensis Amsterdam Albatross [64405]	Endangered	Species or species habitat may occur within area
Diomedea dabbenena Tristan Albatross [66471]	Endangered	Species or species habitat may occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Eudyptula minor Little Penguin [1085]		Breeding known to occur

Name	Threatened	Type of Presence
		within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Halobaena caerulea Blue Petrel [1059]	Vulnerable	Species or species habitat may occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Himantopus himantopus Pied Stilt, Black-winged Stilt [870]		Roosting known to occur within area
Larus novaehollandiae Silver Gull [810]		Breeding known to occur within area
Larus pacificus Pacific Gull [811]		Breeding known to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Species or species habitat known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Limosa limosa Black-tailed Godwit [845]		Roosting known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat likely to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Breeding known to occur within area
Phaethon rubricauda Red-tailed Tropicbird [994]		Breeding known to occur within area

Name	Threatened	Type of Presence
Phalaropus lobatus Red-necked Phalarope [838]		Roosting known to occur within area
Philomachus pugnax Ruff (Reeve) [850]		Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat may occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Pterodroma macroptera Great-winged Petrel [1035]		Foraging, feeding or related behaviour known to occur within area
Pterodroma mollis Soft-plumaged Petrel [1036]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Puffinus assimilis Little Shearwater [59363]		Breeding known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Species or species habitat likely to occur within area
Puffinus pacificus Wedge-tailed Shearwater [1027]		Breeding known to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat known to occur within area
Sterna anaethetus Bridled Tern [814]		Breeding known to occur within area
Sterna bergii Crested Tern [816]		Breeding known to occur within area
Sterna caspia Caspian Tern [59467]		Breeding known to occur within area
Sterna dougallii Roseate Tern [817]		Breeding known to occur within area
Sterna fuscata Sooty Tern [794]		Breeding known to occur within area
Sterna nereis Fairy Tern [796]		Breeding known to occur within area
Thalassarche carteri Indian Yellow-nosed Albatross [64464]	Vulnerable	Foraging, feeding or related behaviour may occur within area
Thalassarche cauta Shy Albatross [89224]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Species or species habitat may occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
[Thalassarche steadi](#) White-capped Albatross [64462]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
[Thinornis rubricollis](#) Hooded Plover [59510]		Species or species habitat known to occur within area
[Tringa glareola](#) Wood Sandpiper [829]		Species or species habitat known to occur within area
[Tringa nebularia](#) Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
[Tringa stagnatilis](#) Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
[Tringa totanus](#) Common Redshank, Redshank [835]		Roosting known to occur within area
[Xenus cinereus](#) Terek Sandpiper [59300]		Roosting known to occur within area
Fish		
[Acentronura australe](#) Southern Pygmy Pipehorse [66185]		Species or species habitat may occur within area
[Campichthys galei](#) Gale's Pipefish [66191]		Species or species habitat may occur within area
[Choeroichthys suillus](#) Pig-snouted Pipefish [66198]		Species or species habitat may occur within area
[Halicampus brocki](#) Brock's Pipefish [66219]		Species or species habitat may occur within area
[Heraldia nocturna](#) Upside-down Pipefish, Eastern Upside-down Pipefish, Eastern Upside-down Pipefish [66227]		Species or species habitat may occur within area
[Hippocampus angustus](#) Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within area
[Hippocampus breviceps](#) Short-head Seahorse, Short-snouted Seahorse [66235]		Species or species habitat may occur within area
[Hippocampus subelongatus](#) West Australian Seahorse [66722]		Species or species habitat may occur within area
[Histiogamphelus cristatus](#) Rhino Pipefish, Macleay's Crested Pipefish, Ring-back Pipefish [66243]		Species or species habitat may occur within area
[Lissocampus caudalis](#) Australian Smooth Pipefish, Smooth Pipefish [66249]		Species or species habitat may occur within area
[Lissocampus fatiloquus](#) Prophet's Pipefish [66250]		Species or species habitat may occur within area
[Lissocampus runa](#) Javelin Pipefish [66251]		Species or species

Name	Threatened	Type of Presence
		habitat may occur within area
Maroubra perserrata Sawtooth Pipefish [66252]		Species or species habitat may occur within area
Mitotichthys meraculus Western Crested Pipefish [66259]		Species or species habitat may occur within area
Nannocampus subosseus Bonyhead Pipefish, Bony-headed Pipefish [66264]		Species or species habitat may occur within area
Phycodurus eques Leafy Seadragon [66267]		Species or species habitat may occur within area
Phyllopteryx taeniolatus Common Seadragon, Weedy Seadragon [66268]		Species or species habitat may occur within area
Pugnaso curtirostris Pugnose Pipefish, Pug-nosed Pipefish [66269]		Species or species habitat may occur within area
Solegnathus lettiensis Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within area
Stigmatopora argus Spotted Pipefish, Gulf Pipefish, Peacock Pipefish [66276]		Species or species habitat may occur within area
Stigmatopora nigra Widebody Pipefish, Wide-bodied Pipefish, Black Pipefish [66277]		Species or species habitat may occur within area
Syngnathoides biaculeatus Double-end Pipehorse, Double-ended Pipehorse, Alligator Pipefish [66279]		Species or species habitat may occur within area
Urocampus carinirostris Hairy Pipefish [66282]		Species or species habitat may occur within area
Vanacampus margaritifer Mother-of-pearl Pipefish [66283]		Species or species habitat may occur within area
Vanacampus phillipi Port Phillip Pipefish [66284]		Species or species habitat may occur within area
Vanacampus poecilolaemus Longsnout Pipefish, Australian Long-snout Pipefish, Long-snouted Pipefish [66285]		Species or species habitat may occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Neophoca cinerea Australian Sea-lion, Australian Sea Lion [22]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Aipysurus pooleorum Shark Bay Seasnake [66061]		Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Foraging, feeding or

Name	Threatened	Type of Presence
		related behaviour known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Foraging, feeding or related behaviour known to occur within area
Disteira kingii Spectacled Seasnake [1123]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Pelamis platurus Yellow-bellied Seasnake [1091]		Species or species habitat may occur within area

Whales and other Cetaceans		[Resource Information]
Name	Status	Type of Presence
Mammals		
Balaenoptera acutorostrata Minke Whale [33]		Species or species habitat may occur within area
Balaenoptera borealis Sei Whale [34]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Migration route known to occur within area
Balaenoptera physalus Fin Whale [37]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Breeding known to occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Stenella attenuata Spotted Dolphin, Pantropical Spotted Dolphin [51]		Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted		Species or species

Name	Status	Type of Presence
Bottlenose Dolphin [68418] Tursiops truncatus s. str. Bottlenose Dolphin [68417]		habitat likely to occur within area Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Carnac Island	WA
Harry Waring Marsupial Reserve	WA
Rottnest Island	WA
Thomsons Lake	WA
Unnamed WA39584	WA
Unnamed WA39752	WA
Unnamed WA42469	WA
Unnamed WA48291	WA
Unnamed WA49220	WA
Unnamed WA49561	WA

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,

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Pavo cristatus Indian Peafowl, Peacock [919]		Species or species habitat likely to occur within area
Phasianus colchicus Common Pheasant [920]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Streptopelia senegalensis Laughing Turtle-dove, Laughing Dove [781]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Mammals		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Funambulus pennantii Northern Palm Squirrel, Five-striped Palm Squirrel [129]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus 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 Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Brachiaria mutica Para Grass [5879]		Species or species habitat may occur within

Name	Status	Type of Presence
		area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may occur within area
Opuntia spp. Prickly Pears [82753]		Species or species habitat likely to occur within area
Pinus radiata Radiata Pine Monterey Pine, Insignis Pine, Wilding Pine [20780]		Species or species habitat may occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Tamarix aphylla 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 Asian House Gecko [1708]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Gibbs Road Swamp System	WA
Rottnest Island Lakes	WA
Thomsons Lake	WA

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 oigations 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.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-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 Environment 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
-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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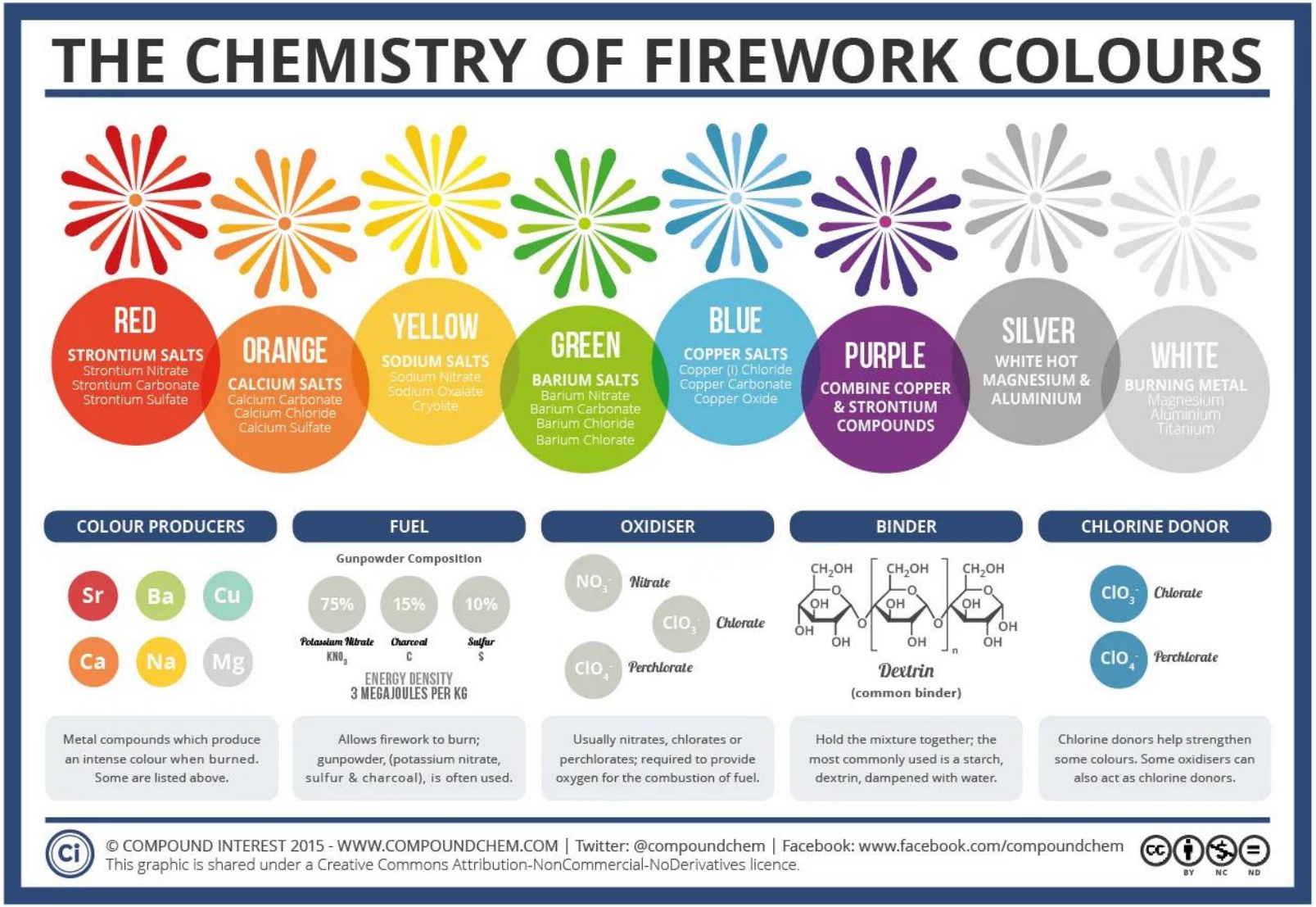
Appendix 2 – 2018/2019 Emissions data within Cockburn – National Pollutant Inventory

Substance	Source	Air (kg)	Land (kg)	Water (kg)	Total (kg)
Acetone	Total	12,308.59			12,308.59
	Polymer Product Manufacturing [191]	10,100.00			10,100.00
	Basic Chemical Manufacturing [181]	2,186.00			2,186.00
	Waste Treatment, Disposal and Remediation Services [292]	22.59			22.59
Acetonitrile	Total	1.32			1.32
	Waste Treatment, Disposal and Remediation Services [292]	1.32			1.32
Acrylonitrile (2-propenenitrile)	Total	19.50			19.50
	Waste Treatment, Disposal and Remediation Services [292]	19.50			19.50
Ammonia (total)	Total	116,753.80	877.89	622,877.50	740,509.19
	Water Supply, Sewerage and Drainage Services [281]	116,753.80		622,877.50	739,631.30
	Waste Treatment, Disposal and Remediation Services [292]		877.89		877.89
Antimony & compounds	Total		0.28		0.28
	Waste Treatment, Disposal and Remediation Services [292]		0.28		0.28
Arsenic & compounds	Total	2.29	0.06	35.14	37.49
	Water Supply, Sewerage and Drainage Services [281]			35.14	35.14
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	2.29			2.29
	Waste Treatment, Disposal and Remediation Services [292]		0.06		0.06
Benzene	Total	69.17	0.15		69.32
	Mineral, Metal and Chemical Wholesaling [332]	55.84			55.84
	Waste Treatment, Disposal and Remediation Services [292]	13.33	0.15		13.48
Beryllium & compounds	Total	1.09	0.02		1.11
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	1.09			1.09
	Waste Treatment, Disposal and Remediation Services [292]		0.02		0.02
Cadmium & compounds	Total	0.78	0.06	8.56	9.40
	Water Supply, Sewerage and Drainage Services [281]			8.56	8.56
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	0.78			0.78
	Waste Treatment, Disposal and Remediation Services [292]		0.06		0.06
Carbon disulfide	Total	0.65			0.65
	Waste Treatment, Disposal and Remediation Services [292]	0.65			0.65
Carbon monoxide	Total	835,675.85			835,675.85
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	823,390.44			823,390.44
	Water Supply, Sewerage and Drainage Services [281]	5,063.30			5,063.30
	Waste Treatment, Disposal and Remediation Services [292]	3,903.11			3,903.11
	Converted Paper Product Manufacturing [152]	1,933.00			1,933.00
	Printing and Printing Support Services [161]	1,386.00			1,386.00
Chlorine & compounds	Total	4,201.92	2,466.46		6,668.38
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	4,201.92			4,201.92
	Waste Treatment, Disposal and Remediation Services [292]		2,466.46		2,466.46
Chloroethane (ethyl chloride)	Total	14.79			14.79
	Waste Treatment, Disposal and Remediation Services [292]	14.79			14.79
Chloroform (trichloromethane)	Total	0.49	0.12		0.61
	Waste Treatment, Disposal and Remediation Services [292]	0.49	0.12		0.61
Chlorophenols (di, tri, tetra)	Total		0.00		0.00
	Waste Treatment, Disposal and Remediation Services [292]		0.00		0.00
Chromium (III) compounds	Total	6.21	0.25	5,063.30	5,069.76
	Water Supply, Sewerage and Drainage Services [281]			5,063.30	5,063.30
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	6.21			6.21
	Waste Treatment, Disposal and Remediation Services [292]		0.25		0.25
Chromium (VI) compounds	Total	2.69			2.69
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	2.69			2.69
Copper & compounds	Total	8.87	0.23	563.81	572.91
	Water Supply, Sewerage and Drainage Services [281]			563.81	563.81
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	8.87			8.87
	Waste Treatment, Disposal and Remediation Services [292]		0.23		0.23
Cumene (1-methylethylbenzene)	Total	3.57			3.57
	Waste Treatment, Disposal and Remediation Services [292]	3.10			3.10
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	0.47			0.47
Cyclohexane	Total	5.08			5.08
	Waste Treatment, Disposal and Remediation Services [292]	5.08			5.08
1,2-Dichloroethane	Total	0.65	0.04		0.70
	Waste Treatment, Disposal and Remediation Services [292]	0.65	0.04		0.70
Dichloromethane	Total	8,195.33	1.84		8,197.16
	Polymer Product Manufacturing [191]	8,165.00			8,165.00
	Waste Treatment, Disposal and Remediation Services [292]	30.33	1.84		32.16
Ethanol	Total	0.62			0.62
	Waste Treatment, Disposal and Remediation Services [292]	0.62			0.62
Ethyl acetate	Total	9.62			9.62
	Waste Treatment, Disposal and Remediation Services [292]	9.62			9.62
Ethylbenzene	Total	46.09	0.24		46.34
	Waste Treatment, Disposal and Remediation Services [292]	29.97	0.24		30.22
	Mineral, Metal and Chemical Wholesaling [332]	16.12			16.12
Fluoride compounds	Total	351.60	1.63		353.23
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	351.60			351.60
	Waste Treatment, Disposal and Remediation Services [292]		1.63		1.63
Formaldehyde (methyl aldehyde)	Total	66.50			66.50
	Waste Treatment, Disposal and Remediation Services [292]	66.50			66.50
n-Hexane	Total	15.54			15.54

	Waste Treatment, Disposal and Remediation Services [292]	15.54			15.54
Hydrochloric acid	Total	1,947.26			1,947.26
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	1,947.26			1,947.26
Hydrogen sulfide	Total	63.31			63.31
	Waste Treatment, Disposal and Remediation Services [292]	63.31			63.31
Lead & compounds	Total	2.93	0.26	49.01	52.20
	Water Supply, Sewerage and Drainage Services [281]			49.01	49.01
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	2.93			2.93
	Waste Treatment, Disposal and Remediation Services [292]		0.26		0.26
Manganese & compounds	Total	12.66			12.66
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	12.66			12.66
Mercury & compounds	Total	1.53	0.00	2.82	4.35
	Water Supply, Sewerage and Drainage Services [281]			2.82	2.82
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	1.53			1.53
	Waste Treatment, Disposal and Remediation Services [292]	0.00	0.00		0.00
Methyl ethyl ketone	Total	29.68			29.68
	Waste Treatment, Disposal and Remediation Services [292]	29.68			29.68
Methyl isobutyl ketone	Total	10.87			10.87
	Waste Treatment, Disposal and Remediation Services [292]	10.87			10.87
Methyl methacrylate	Total	1,050.00			1,050.00
	Polymer Product Manufacturing [191]	1,050.00			1,050.00
Nickel & compounds	Total	26.16	0.71	243.26	270.13
	Water Supply, Sewerage and Drainage Services [281]			243.26	243.26
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	26.16			26.16
	Waste Treatment, Disposal and Remediation Services [292]		0.71		0.71
Oxides of Nitrogen	Total	865,845.73			865,845.73
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	854,452.53			854,452.53
	Water Supply, Sewerage and Drainage Services [281]	6,691.20			6,691.20
	Converted Paper Product Manufacturing [152]	2,692.00			2,692.00
	Printing and Printing Support Services [161]	2,010.00			2,010.00
Particulate Matter 10.0 um	Total	62,436.13			62,436.13
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	60,366.83			60,366.83
	Water Supply, Sewerage and Drainage Services [281]	1,895.90			1,895.90
	Printing and Printing Support Services [161]	96.40			96.40
	Converted Paper Product Manufacturing [152]	77.00			77.00
Particulate Matter 2.5 um	Total	6,332.84			6,332.84
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	4,275.84			4,275.84
	Water Supply, Sewerage and Drainage Services [281]	1,895.90			1,895.90
	Printing and Printing Support Services [161]	84.10			84.10
	Converted Paper Product Manufacturing [152]	77.00			77.00
Phenol	Total		1.59		1.59
	Waste Treatment, Disposal and Remediation Services [292]		1.59		1.59
Polychlorinated dioxins and furans (TEQ)	Total	0.00			0.00
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	0.00			0.00
Polycyclic aromatic hydrocarbons (B[a]Peq)	Total	2.55			2.55
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	2.51			2.51
	Printing and Printing Support Services [161]	0.03			0.03
	Converted Paper Product Manufacturing [152]	0.01			0.01
Styrene (ethenylbenzene)	Total	83,853.17			83,853.17
	Polymer Product Manufacturing [191]	83,850.69			83,850.69
	Waste Treatment, Disposal and Remediation Services [292]	2.48			2.48
Sulfur dioxide	Total	107,115.43			107,115.43
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	104,548.73			104,548.73
	Water Supply, Sewerage and Drainage Services [281]	2,541.50			2,541.50
	Printing and Printing Support Services [161]	14.20			14.20
	Converted Paper Product Manufacturing [152]	11.00			11.00
Tetrachloroethylene	Total	19.54			19.54
	Waste Treatment, Disposal and Remediation Services [292]	19.54			19.54
Toluene (methylbenzene)	Total	209.36	1.71		211.08
	Waste Treatment, Disposal and Remediation Services [292]	158.88	1.71		160.60
	Mineral, Metal and Chemical Wholesaling [332]	50.48			50.48
Toluene-2,4-diisocyanate	Total	0.50			0.50
	Polymer Product Manufacturing [191]	0.50			0.50
Total Nitrogen	Total			1,420,857.60	1,420,857.60
	Water Supply, Sewerage and Drainage Services [281]			1,420,857.60	1,420,857.60
Total Phosphorus	Total			327,347.50	327,347.50
	Water Supply, Sewerage and Drainage Services [281]			327,347.50	327,347.50
Total Volatile Organic Compounds	Total	150,540.69			150,540.69
	Polymer Product Manufacturing [191]	103,165.69			103,165.69
	Other Transport Equipment Manufacturing [239]	23,986.00			23,986.00
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	13,496.37			13,496.37
	Mineral, Metal and Chemical Wholesaling [332]	3,846.08			3,846.08
	Waste Treatment, Disposal and Remediation Services [292]	3,846.03			3,846.03
1,1,2-Trichloroethane	Total	1.22			1.22
	Waste Treatment, Disposal and Remediation Services [292]	1.22			1.22
Trichloroethylene	Total	6.32			6.32
	Waste Treatment, Disposal and Remediation Services [292]	6.32			6.32
Vinyl Chloride Monomer	Total	5.15	0.17		5.32

	Waste Treatment, Disposal and Remediation Services [292]	5.15	0.17		5.32
Xylenes (individual or mixed isomers)	Total	10,788.84			10,788.84
	Other Transport Equipment Manufacturing [239]	10,720.00			10,720.00
	Waste Treatment, Disposal and Remediation Services [292]	57.67			57.67
	Mineral, Metal and Chemical Wholesaling [332]	11.17			11.17
Zinc and compounds	Total	17.15	2.84	3,382.73	3,402.72
	Water Supply, Sewerage and Drainage Services [281]			3,382.73	3,382.73
	Cement, Lime, Plaster and Concrete Product Manufacturing [203]	17.15			17.15
	Waste Treatment, Disposal and Remediation Services [292]		2.84		2.84

Appendix 3 – The Chemicals in Fireworks (Compound Interest, 2013)



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