

ENVIRONMENTAL ASSESSMENT REPORT

Ashburton North Strategic Industrial Area Improvement Scheme

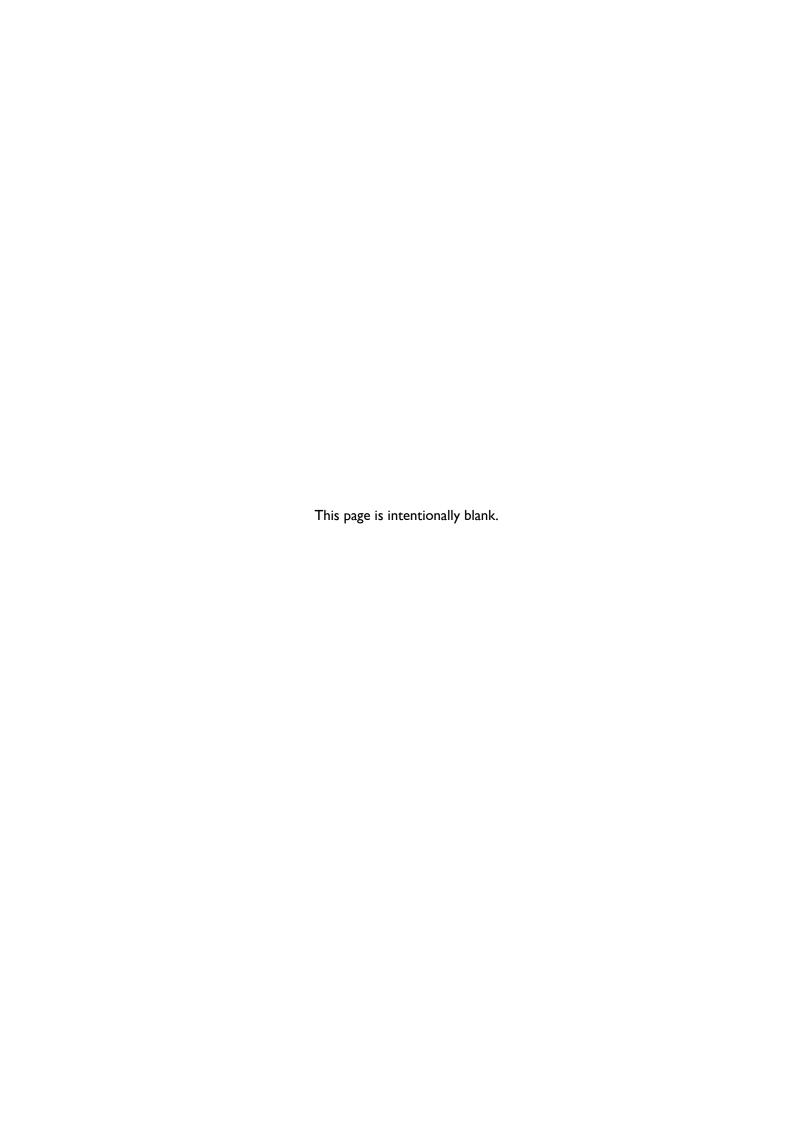














ENVIRONMENTAL ASSESSMENT REPORT

Ashburton North Strategic Industrial Area Improvement Scheme

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ACRONYMS AND ABBREVIATIONS

Acronym	Definition
ARI	Average Recurrence Interval
ANZECC	Australian and New Zealand Environment Conservation Council
ANSIA	Ashburton North Strategic Industrial Area
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
ASS	Acid Sulfate Soils
ВНРВ	BHP Billiton Ltd
CUCA	Common user coastal area
DAA	Department of Aboriginal Affairs
DER	Department of Environment
DPaW	Department of Parks and Wildlife
DotE	Department of the Environment
DoW	Department of Water
DotE	Department of the Environment
DWMS	District Water Management Strategy
EAG	Environmental Assessment Guidelines
EPA	Environmental Protection Authority
EP Act	Environment Protection Act 1986
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
GIA	General Industry Area
Н	High conservation significance
ha	hectares
km	kilometres
LNG	Liquefied natural gas
LWMS	Local Water Management Strategy
М	Moderate conservation significance
MNES	Matters of National Environmental Significance
MST	Model Scheme Text
MUAIC	Multi-user access and infrastructure corridor
OEPA	Office of the Environmental Protection Authority
RPS	RPS Environment and Planning Pty Ltd
Р	Priority flora
PEC	Priority Ecological Community
TDS	Total Dissolved Solids
TEC	Threatened Ecological Communities
TPS	Town Planning Scheme
TWA	Transient Workers Accommodation



Acronym	Definition
WAPC	Western Australian Planning Commission
WC Act	Wildlife Conservation Act 1950



SUMMARY

Strategic Industrial Area Context

The Ashburton North Strategic Industrial Area (ANSIA) is located within Western Australia's north-west, situated 12 kilometres (km) from the Onslow town site (Figure 1).

The ANSIA is situated over multiple lots, largely in the state of Western Australia or Western Australian Land Authority (LandCorp) ownership.

The ANSIA also partially extends into land that is subject to the Onslow Solar Salt Act 1992 and the Port Authorities Act 1999.

The ANSIA plays a critical role in providing for the future energy needs of Western Australia and internationally through the exploitation of liquefied natural gas (LNG) found within the Carnarvon Basin. A key component in providing for onshore gas processing and storage, in addition to facilitating the establishment of support industries in proximity to gas processing the ANSIA will enable the realisation of the potential of the resource industry within the north-west.

The development of the ANSIA commenced in the late 2000s with substantial inputs from state government, local government and key stakeholders setting up the current planning and development framework. This has seen the commissioning of BHPB's Macedon Domestic Gas Plant and the current construction of Chevron's Wheatstone LNG Plant.

Existing development within the ANSIA consists of the following (Figure B):

- Macedon Domestic Gas Plant
- Wheatstone LNG Plant
- Wheatstone Construction Village
- Port and Common User Facility
- Macedon Access Road, Onslow Road, Old Onslow Road, Twitchin Road
- Infrastructure associated with the existing facilities.

ANSIA Site Details

The ANSIA consists of a strategic industry area, a multi-user access and infrastructure corridor, two general industry areas for support businesses, and a workforce accommodation area.

The location of the development areas are provided in Figures B and 5.

Statutory Planning Framework

The characteristics and specific requirements of the ANSIA create the need for an appropriate statutory planning framework to manage the allocation and future development of land within the ANSIA boundary. Pursuant to Improvement Plan No. 41, an Improvement Scheme is proposed to



be established. The Improvement Scheme zones land within the scheme area of the purposes defined in the scheme and therefore controls and guide land use and development. Importantly, the Improvement Scheme makes provision for the administration and enforcement of the scheme, e.g. specific Scheme Provisions.

The Improvement Scheme will be the principal statutory tool for implementing the strategic planning objectives for the project and the Improvement Scheme Report provides an outline of the planning arrangements as they apply to the area, the strategic intentions for the industrial areas and an overview of the statutory provisions of the Improvement Scheme.

The Western Australian Planning Commission (WAPC) is the "Responsible Authority" for implementing the Improvement Scheme. Consequently, the WAPC is also responsible for the Guide Plan and any Planning Policies that are prepared under the terms of the scheme.

The Guide Plan provides the spatial guide for the preparation, assessment and determination of applications for subdivision and development.

Under the Improvement Scheme, a primary role of the WAPC is to receive, assess and determine applications for planning approval within the ANSIA. Future applications will be determined having regard for compliance with statutory requirements including the Improvement Scheme provisions and the Guide Plan. The Improvement Scheme (as shown in the ANSIA Improvement Scheme Map) includes the following zones (Figure 5):

- Strategic Industry
- General Industry
- Infrastructure
- Workforce Accommodation
- Industry Protection
- Special Use.

Purpose of Report

The purpose of this report is to:

- Define the key environmental characteristics and issues of the ANSIA based on desktop assessments and site surveys.
- Identify the relevant policy and guideline documents that have been considered and that are relevant to the site.
- Define the Environmental Protection Authority (EPA) objectives relevant to environmental characteristics identified on site, potential impacts and mitigation measures proposed through the Improvement Scheme and Guide Plan for assessment by the EPA under Section 48 of the Environmental Protection Act 1986 (EP Act).



 Ensure future industrial development is managed by proposed statutory mechanisms (the Improvement Scheme and/or Guide Plan) which will be administered by the WAPC as the Responsible Authority (in consultation with the EPA and other relevant authorities).

Historical Environmental Assessments

The ANSIA has been subject to a multiple biological (vegetation/flora and fauna) surveys, hydrological studies and marine studies in order to achieve planning and environmental approvals for the existing developments. The areas within ANSIA that have been subject to an environmental assessment and biological assessments include:

- Shire of Ashburton TPS No. 7 Amendment No. 9 EPA advice provided
- Wheatstone LNG Plant formally assessed by the EPA
- Shire of Ashburton TPS No. 7 Amendment No. 10 (Stage IA) EPA advice provided
- Macedon Domestic Gas Plant formally assessed by the EPA
- Shire of Ashburton TPS No. 7 Amendment No. 17 (Stage 1B) EPA advice provided
- Shire of Ashburton TPS No. 7 Amendment No. 18 (Stage 1C) EPA advice provided
- Onslow Power Infrastructure Upgrade Project EPA advice provided.

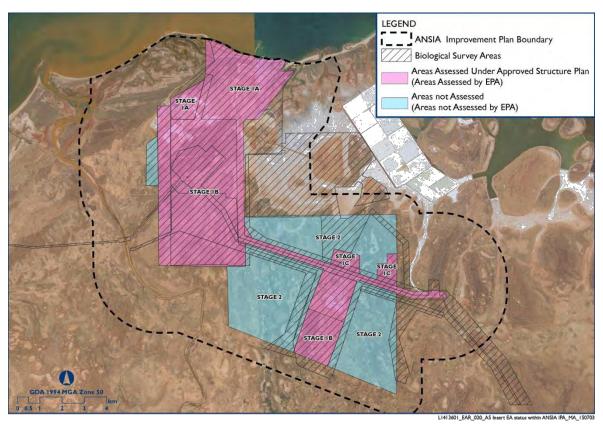


Figure A: Environmental and Planning Assessment(s) and Biological Survey Locations within ANSIA



Identified Key Environmental Factors for the Improvement Scheme

This Environmental Assessment Report of the project study area addresses the following themes of land, water and people in accordance with the EPA's Environmental Assessment Guidelines (EAG) No. 8:

- land factors
 - terrestrial environmental quality
 - terrestrial flora and vegetation
 - terrestrial fauna
- sea factors
 - marine fauna
- water factors
 - hydrological processes
- people factors
 - Aboriginal heritage
 - European heritage.

A key conclusion of this Environmental Assessment Report is that, based the key investigations and a review of other environmental impact assessments in the region, none of the identified key environmental risk factor alone presented a significant environmental impact which would preclude development within the ANSIA.

The key environmental factors (or risks) identified include:

- flora and vegetation
- terrestrial fauna
- hydrological process.

Other environmental factors identified include:

- terrestrial environmental quality acid sulfate soils
- Aboriginal heritage.

Environmental Management Framework

There are a number of environmental factors identified in this report and through historical assessment by the EPA. As part of the ANSIA project consultation process a summary of the historical biological surveys was provided to the Office of the Environmental Protection Authority (OEPA).



The OEPA advised that the survey information provided for projects within the ANSIA are sufficient for the areas they cover. However, on land that has not been surveyed, or on land not already zoned for development, (which is predominately land to be zone "Industry Protection Zone" under the Improvement Scheme) the OEPA has recommended the following information is provided as part of any development proposal:

- A Level I flora survey consistent with Guidance Statement 51 (EPA 2004) should be conducted across the areas that have not been mapped and/or ground-truthed. Vegetation mapping by Biota (2010a) and Outback Ecology Services (2010) (reported in Biota 2010b) should be extrapolated across the unsurveyed areas a desktop exercise. Ground-truthing should then be conducted for this mapping as well as the areas that were mapped by Biota (2010b) through aerial photography interpretation but were not ground-truthed.
- A targeted flora survey is required in the habitats likely to support the conservation significant flora identified in previous surveys.
- Surveys and ground-truthing should be conducted in the appropriate seasons.
- A Level I fauna assessment is to be undertaken to map fauna habitats across the study area as recommended by the "Ashburton North Strategic Industrial area Biological Desktop Review" (ENV 2012b).
- A targeted Level 2 fauna survey is to be undertaken to determine the presence of any of the significant fauna species that are predicted by ENV (2012c) or RPS (2014b) as likely to occur.

The OEPA advice is provided in Appendix I.

Other key environmental issues such as hydrological process and terrestrial environmental quality are capable of being resolved (i.e. avoided or managed) through site-specific investigations and detailed engineering drainage design.

At a future time when the nature and land requirements for industrial development(s) are more comprehensively known (i.e. detailed planning design/subdivision stage), the developments will be subject to the environmental Scheme Provisions outlined in Table I. The specific requirements of the environmental management plans will be included in the Guide Plan.



Table I: **ANSIA** Development Requirements - Improvement Scheme and Guide Plan

Zone	Improvement Scheme (Part 4 of Text)	Guide Plan (To be Appended to Scheme Text)
Strategic Industry	If applicable, scheme text to set out environmental conditions applicable to the scheme as a result of an assessment carried out under the <i>Environmental Protection Act 1986</i> Part IV Division 3. If no environmental conditions apply, the scheme text will state, "There are no environmental conditions imposed under the <i>Environmental Protection Act 1986</i> that apply to this scheme".	All planning applications or applications for subdivision within the Strategic Industry zone shall be referred to the Environmental Protection Authority for assessment under Section 38 of the Environmental Protection Act 1986 (WA). Subdivision and development shall be in accordance with the following environmental requirements (as relevant): (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan (d) Terrestrial Weed Management Plan (e) Marine Turtle Baseline Lighting Survey and Design Guidelines (if required) (f) Water Management Plan (g) Acid Sulfate Soil and Dewatering Management Plan (h) *Noise and Air Quality Management Plan
General Industry		Subdivision and development shall be in accordance with the following environmental requirements (as relevant) to the satisfaction of the Commission: (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan (d) Water Management Plan
Infrastructure Zone		(a) Fire Management Plan (b) Construction Environmental Management Plan (c) Water Management Plan
Workforce Accommodation/ Special Use		Subdivision and development shall be in accordance with the following environmental requirements (as relevant) to the satisfaction of the Commission: (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan (d) Water Management Plan

*due regard shall be given to any:

Additional Proponent Environmental Considerations

Commonwealth Environment Protection Biodiversity Conservation Act 1999 (EPBC Act)

This assessment also identified potential impacts to Matters of National Environmental Significance (MNES). Subject to further project planning and site-specific design detail, a referral and likely Ministerial approval under the Commonwealth EPBC Act may be required by future proponents. It is recommended that future proponents consider undertaking a significant impact test against the Commonwealth Significant Impact Guidelines I.I - Matters of National Environmental Significance prior to determining whether to refer a proposal to the Commonwealth.

 ⁽i) Applicable operating licence granted under Part 5 of the EP Act.
 (ii) Previous advice provided by the Environmental Protection Authority as a result of Section 38 and 48 Referrals.



Proponent Industrial Buffers

Within the Strategic Industry zone (which accommodates current and future hydrocarbon processing activities), each industrial proposal will need to assess and accommodate its own risk buffer within its leasehold area in accordance with the EPA's recommended separation distances.

For development proposals within the Strategic Industry zone a specific environmental assessment for example of air quality, noise and human health risk will need to be undertaken in consultation with the EPA as part of a referral and assessment under Section 38 of the EP Act. This assessment would also delineate separation distances between industrial developments within the ANSIA.

There are several environmental provisions under Part V of the EP Act, including pollution and environmental harm offences and prescribed premises, works approvals and licences, notices, orders and directions and noise provisions in addition to the Environmental Protection (Noise) Regulations 1997.

Certain industrial premises with significant potential to cause emissions and discharges to air, land or water (for example chemical manufacturing, electric power generation bulk storage of chemicals, processing/beneficiation of metallic or non-metallic ore) are known as "prescribed premises" and trigger regulation under the EP Act.

"Prescribed premises" are engaged in activities that produce emissions and discharges that have significant risk to the environment and trigger the regulation of management through a licence. Works approvals and licences are issued by DER with conditions that apply to specific premises and are intended to prevent or minimise the emissions and discharges of waste to the environment.

The spatial outcome for the Strategic Industry zone is that each industrial development will require a buffer from neighbouring industries. This outcome will create "pods" of industrial development(s), connected by roads and common infrastructure within the ANSIA landscape.

Summary

Table 2 provides a summary of the environmental factors and objectives, the potential impacts, and proposed management measures. The specific requirements of the management plans will be included in the Guide Plan.



 Table 2:
 Summary Table of the Relevant Environmental Factors

Environmental Factor	Environmental Objective	Applicable Legislation and/or Guidelines	Potential Impacts	Proposed Management Response The Specific Requirements of the Management Plans Will be Included in the Guide Plan
Land				
Vegetation and Flora	To maintain representation, diversity, viability and ecological function at the species, population and community level	 Wildlife Conservation Act 1950 Environmental Protection Act 1986 Environmental Protection (Clearing of Native Vegetation) Regulations 2004 Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia (EPA 2000) Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a) Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004c). 	The potential impacts on terrestrial flora and vegetation from the development of the project study area include: clearing of terrestrial vegetation impacts on Priority flora species introduction and distribution of weed species unnecessary clearing hydrological changes.	Potential environmental impacts to flora and vegetation will be addressed at subdivision using the mitigation sequence (i.e. avoidance, minimise, rectify, reduce, offset) and through the preparation and implementation of the following environmental management plans as part of future subdivision design and approval: Construction Environmental Management Plan Water Management Plan. The scheme text, will require these management plans to be prepared (as relevant) as part of future subdivision and approval. The specific requirements of the management plans will be included in the Guide Plan. With respect to proposed development on land that has not been biologically surveyed, the Guide Plan will require future proponents to carry out a Terrestrial Flora and Vegetation Survey in support of any applications for planning approval. The specific requirements of the survey will be included within the Guide Plan
Terrestrial Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level	 Wildlife Conservation Act 1950 Environmental Protection Act 1986 Environment Protection and Biodiversity Conservation Act 1999 Environmental Protection (Clearing of Native Vegetation) Regulations 2004 	Species identified that may be potentially impacted by the proposal include: animal deaths during the clearing process and the destruction of burrows and retreat sites habitat fragmentation an increased abundance of introduced species (cats and wild dogs)	Potential environmental impacts to fauna will be addressed at subdivision using the mitigation sequence (i.e. avoidance, minimise, rectify, reduce, offset) and through the preparation and implementation of the following environmental management plans: Construction Environmental Management Plan. The scheme text, will require these management plans to be prepared (as relevant) as part of future subdivision and approval. The specific requirements of the management plans will be included in the Guide Plan.



Environmental Factor	Environmental Objective	Applicable Legislation and/or Guidelines	Potential Impacts	Proposed Management Response The Specific Requirements of the Management Plans Will be Included in the Guide Plan
		 Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a) Guidance Statement No. 20: Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009) Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004d). 	road fauna deaths, in particular this is likely to impact kangaroos, nocturnal birds and ground dwelling large carnivorous predators.	With respect to proposed development on land that has not been biologically surveyed, the Guide Plan will require future proponents to carry out a Terrestrial Fauna Survey in support of any applications for planning approval. The specific requirements of the survey will be included within the Guide Plan.
Terrestrial Environmental Quality – Acid Sulfate Soils	To maintain the quality of land and soils so that the environmental values, both ecological and social, are protected	 Environmental Protection Act 1986 Contaminated Sites Act 2003 Assessment Levels for Soil, Sediment and Water (DEC 2010) Acid Sulfate Soils Guideline Series. Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes (DEC 2011) Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2013). 	The majority of the industrial areas have no know ASS mapped across them, however the drainage lines have been mapped as having a high risk of ASS.	 If ASS is identified as occurring and is proposed to be disturbed by construction works, an Acid Sulfate Soil and Dewatering Management Plan is required to be prepared as part of future development. The objectives of the Acid Sulfate Soil and Dewatering Management Plan will be to adequately identify "actual" and "potential" acid sulfate soils and determine appropriate management strategies and construction practices to be followed to ensure effective handling, treatment and disposal of acid sulfate soils and produced water. The scheme text will require an Acid Sulfate Soil and Dewatering Management Plan to be prepared (as relevant) as part of future subdivision and approval. The specific requirements of the management plan will be included in the Guide Plan.



Environmental Factor	Environmental Objective	Applicable Legislation and/or Guidelines	Potential Impacts	Proposed Management Response The Specific Requirements of the Management Plans Will be Included in the Guide Plan
Sea				
Marine Fauna	To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.	 Environmental Protection Act 1986 Wildlife Conservation Act 1950 Environment Protection and Biodiversity Act 1999 Environmental Assessment Guideline No. 5: Protecting Marine Turtles from Light Impacts (EPA 2010) 	Future industrial development within the Strategic Industry Zone of the ANSIA has the potential to contribute to cumulative light impacts (skyglow), to the existing night light environment of Ashburton River Delta Beach, which may potentially disrupt turtle nesting.	 Potential environmental impacts to marine turtles will be addressed by requiring any future planning applications within the Strategic Industry Zone undertake Baseline lighting studies. The purpose of this study will be to inform the expected cumulative lighting impacts from the proposed industrial development upon marine turtles nesting on the Ashburton River Delta Beach. The Guide Plan, as relevant, will require future proposed industrial developments within the Strategic Industry Zone to undertake a Marine Turtle Baseline Lighting Study in support of any applications for planning approval. The specific requirements of the Marine Turtle Baseline Lighting Study will be included within the Guide Plan. Should the Marine Turtle Baseline Lighting Study predict potential significant impacts from lighting on marine turtles from development, then the preparation and implementation of Design Guidelines for reducing light emissions will be required.



Environmental Factor	Environmental Objective	Applicable Legislation and/or Guidelines	Potential Impacts	Proposed Management Response The Specific Requirements of the Management Plans Will be Included in the Guide Plan
Water				
Hydrological Processes	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected	 Environmental Protection Act 1986 Rights in Water and Irrigation Act 1914 Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC and ARMCANZ) 2000) Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006) State Planning Policy 2.9 – Water Resources (WAPC 2006a) Better Urban Water Management (WAPC 2008). 	Potential impacts to hydrology on the site includes: groundwater level changes that occur as a result of a change in land use removal of vegetation and installation of impervious surfaces that lead to an increase in run-off during rainfall events development may result in an increase in the potential for industrial generated pollutants, such as nutrients, hydrocarbons, litter and sediment, being transported, through surface water run-off, into the local storm water drainage system development may result in changes to surface water flows. In terms of potential impacts to proposed development on the site due to on-site hydrological conditions, the subject land may be impacted by flooding during high rainfall or less frequent extreme events, such as tropical cyclones (during site surveys, parts of the site were flooded due to high rainfall)	 A District Water Management Strategy and Local Water Management Strategy have been prepared and approved by the Department of Water for the ANSIA. The purpose of the DWMS is to demonstrate that the area is capable of supporting the industrial development and is able to achieve appropriate urban water management outcomes, particularly as there have been areas identified that will be subject to significant depths of flooding at high velocities. In addition to identifying and addressing these constraints, the preparation of the DWMS will identify and discuss other significant environmental factors pertaining to the development of the site. The scheme text will require Urban Water Management Plans to be prepared as part of future subdivision and development approvals. The specific requirements of the management plan will be included in Guide Plan and detailed in the DWMS.



Environmental Factor	Environmental Objective	Applicable Legislation and/or Guidelines	Potential Impacts	Proposed Management Response The Specific Requirements of the Management Plans Will be Included in the Guide Plan
People				
Aboriginal Heritage	To ensure that historical and cultural associations, and natural heritage, are not adversely affected	 Aboriginal Heritage Act 1972 Heritage of Western Australia Act 1990 Native Title Act 1993 Aboriginal Heritage Due Diligence Guidelines (DIA 2013) Guidance Statement No. 41: Assessment of Aboriginal Heritage (EPA 2004b). 	A search of the DAA Aboriginal Heritage Enquiry System indicates that approximately 109 Aboriginal sites located within vicinity of the ANSIA.	The Improvement Scheme and/or Guide Plan will set out the Aboriginal heritage and native title compliance requirements in accordance with the Aboriginal Heritage Act 1972 (WA).



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1.0 INTRODUCTION

I.I Location

The Ashburton North Strategic Industrial Area (ANSIA) and Improvement Scheme area is located within Western Australia's north-west, situated 12 kilometres (km) from the Onslow town site.

Consisting of 20,250 hectares (ha) the ANSIA Improvement Scheme area includes a 3 km land use protection zone around the heavy industrial core and utilities within the ANSIA and a 1 km land use protection zone around the workforce accommodation and lower intensity activities, areas which previously made up the 8,000 ha strategic industrial area (Figures A and 1).

The ANSIA is situated over multiple lots, largely in the state of Western Australia or Western Australian Land Authority (LandCorp) ownership. A number of lease arrangements exist over the lots in order to facilitate the use and development of the land for gas processing and related activities. Key interest holders include Forest and Forest Pty Ltd, BHP Billiton Ltd and Chevron Australia Pty Ltd. The ANSIA also partially extends into land that is subject to the *Onslow Solar Salt Agreement Act 1992* and the *Port Authorities Act 1999*.

The adjacent Port of Ashburton is intrinsic to the development of the strategic industrial area with access to this area and its associated infrastructure is a critically important component of the development. The planning is based on a multi-user access and infrastructure corridor (MUAIC) providing connectivity between industries, the common user coastal area (CUCA) and the port. The MUAIC contains road access together with shared utility/infrastructure alignments and service corridors.

I.2 ANSIA Development

The ANSIA plays a critical role in providing for the future energy needs of Western Australia and internationally through the exploitation of liquefied natural gas (LNG) found within the Carnarvon Basin. A key component in providing for onshore gas processing and storage, in addition to facilitating the establishment of support industries in proximity to gas processing the ANSIA will enable the realisation of the potential of the resource industry within the north-west.

The development of the ANSIA commenced in the late 2000s with substantial inputs from state government, local government and key stakeholders setting up the current planning and development framework. This has seen the commissioning of BHP Billiton's (BHPB) Macedon Domestic Gas Plant and the current construction of Chevron's Wheatstone LNG Plant. Further development may be realised through further exploration and development of the Carnarvon Basin.



With some projects touting a 50+ year lifespan in providing for the delivery of domestic and international gas, the co-ordinated and timely development of the ANSIA is critical to providing for the establishment of the required infrastructure and support services vital to unlocking the exploitation of resources on the North West Shelf.

1.2.1 Key Site and Proposal Characteristics

The ANSIA consists of a core strategic industry area, a multi-user access and infrastructure corridor, two general industry areas for support businesses, and a workforce accommodation area.

The ANSIA key site and proposal characteristics are summarised in Table 3.

Table 3: Key Site and Proposal Characteristics of the ANSIA Project

Aspect	Description		
Project location	ANSIA is approximately 12 km from Onslow		
Current Zoning (under Town Planning Scheme No. 7)	 Strategic Industry Reserve for Other Purposes - Infrastructure Special Use – Transient Workforce Accommodation General Industry Rural Reserve for Conservation, Recreation and Natural Landscapes 		
Current responsible authority	Shire of Ashburton		
Proposed zoning (Improvement Scheme)	 Strategic Industry (2995.78 ha) Infrastructure (1006.43 ha) Workforce Accommodation (626.55 ha) General Industry (200.97 ha) Industry Protection (15058.82 ha) Special Use (266.90 ha) 		
Proposed responsible authority	Western Australian Planning Commission		
Current land use	 Macedon Domestic Gas Plant Wheatstone LNG Plant Wheatstone Construction Village Port and Common User Facility Infrastructure associated with the existing facilities Macedon Access Road, Onslow Road, Old Onslow Road, Twitchin Road. 		
Surrounding land uses	Old Onslow town siteOnslow SaltPastoral leases		



In order to provide an effective planning framework for future development within the ANSIA, an Improvement Plan has been prepared. The Improvement Plan establishes a framework for land use co-ordination and infrastructure delivery through highlighting the provisions that will be required within an Improvement Scheme and Guide Plan.

The Improvement Plan will ensure sufficient guidance is provided in order to ensure the development of an Improvement Scheme and Guide Plan provides for the following:

- streamlining of the approval process
- reducing the layer of planning required
- avoiding duplication and inconsistencies in requirements / planning provisions
- ensuring projects of state significance are appropriately considered
- ensuring local planning is not neglected or adversely impacted by development.

The Improvement Scheme zones land within the scheme area of the purposes defined in the scheme and therefore controls and guide land use and development. Importantly, the Improvement Scheme makes provision for the administration and enforcement of the scheme, e.g. specific Scheme Provisions.

The Guide Plan is included in the Improvement Scheme for the purposes of:

- 1. Providing spatial arrangement of planned industrial activities.
- 2. Identifying criteria and considerations to be addressed by proponents in preparing applications for subdivision and planning approval.
- 3. Providing guidance for the assessment and determination of applications for subdivision and planning approval by the Western Australian planning Commission (WAPC).

The Guide Plan is intended to be interpreted and applied with flexibility, responding to specific requirements of future proponents as needs of particular industries become apparent. The specific requirements of the environmental management plans will be included in the Guide Plan.

I.3 Purpose of Report

The purpose of this report is to:

- Define the key environmental characteristics and issues of the ANSIA based on desktop assessments and site surveys.
- Identify the relevant policy and guideline documents that have been considered and that are relevant to the site.



- Define the Environmental Protection Authority (EPA) objectives relevant to environmental characteristics identified on site, potential impacts and mitigation measures proposed through the Improvement Scheme and Guide Plan for assessment by the EPA under Section 48 of the Environmental Protection Act 1986 (EP Act).
- Ensure future industrial development is managed by proposed statutory mechanisms (the Improvement Scheme and Guide Plan) which will be administered by the WAPC as the Responsible Authority (in consultation with the EPA and other relevant authorities).

1.4 Scope of Report

1.4.1 Identified Key Environmental Factors

This environmental assessment of the project study area addresses the following themes of land, water, air and people in accordance with the EPA (2015a) Environmental Assessment Guidelines (EAG) No. 8:

- land factors
 - terrestrial environmental quality
 - terrestrial flora and vegetation
 - terrestrial fauna
- sea factors
 - marine fauna
- water factors
 - hydrological processes
- people factors
 - Aboriginal heritage
 - European heritage.

1.4.2 Scope of Works

In order to address the relevant environmental factors, and provide a high level assessment of the potential environmental impacts, the report draws upon site surveys undertaken within the ANSIA as well as past environmental investigations, including state and Commonwealth environmental impact assessments (Section 2.2), that have been conducted within and adjacent to the ANSIA (Figure 2).



1.4.2.1 Flora and Vegetation

A number of terrestrial flora and vegetation surveys and assessments have been undertaken within and adjacent to the ANSIA in recent years. The survey area boundaries for each of these flora and vegetation surveys are presented in Figure 3.

The following flora and vegetation assessments provide some additional context on the flora and vegetation within the ANSIA and at a regional level.

- Astron Environmental Services (Astron) 2009. BHPB Macedon Gas Development Flora and Vegetation Survey (Phases I and 2). Report prepared for URS Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2010a. A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2010b. Wheatstone Project Flora and Fauna Assessment Addendum. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2013. Desktop Review of the Proposed Onslow Micro-Siting Survey Area. Report prepared for Chevron Australia Pty Ltd
- ENV Australia Pty Ltd (ENV) 2012a. Ashburton North Strategic Industrial Area Flora and Vegetation Assessment. Report prepared for The Planning Group
- ENV Australia Pty Ltd (ENV) 2012b. Ashburton North Strategic Industrial Area.
 Biological Desktop Review. Report prepared for The Planning Group
- Onshore Environmental Consultants 2008. Flora and Vegetation Survey: Ashburton North Project Area. Report prepared for Chevron Australia Pty Ltd
- Onshore Environmental Consultants 2009. Flora and Vegetation Survey: Ashburton North Project Area – Stage 2. Report prepared for Chevron Australia Pty Ltd
- Outback Ecology Services 2010. Wheatstone Amendment Area: Flora and Vegetation Assessment. Report prepared for Golder Associates on behalf of Chevron Australia Pty Ltd
- RPS 2009. Baseline Flora and Vegetation Survey, Ashburton North Pipeline Route
 Option 3. Report prepared for Chevron Australia Pty Ltd.



In 2014, RPS undertook a review of the above flora and vegetation reports relevant to the ANSIA. The purpose of this review was to (RPS 2014a):

- a) Assess the adequacy of the existing data for the ANSIA in terms of informing potential impacts to flora and vegetation values.
- b) Identify any gaps to determine the need for further surveys.

The outcome of the flora and vegetation literature review is presented in a report (Appendix 2) and summarised in Section 6.3 of this report. In summary, the literature review identified that the studies undertaken so far are considered adequate and that no further flora and vegetation surveys is required as part of the development of the Improvement Plan and Scheme for the ANSIA.

Preliminary Consultation with OEPA

Ahead of the ANSIA Improvement Scheme being referred to the Environmental Protection Authority (EPA), preliminary advice was sought from the Office of the Environmental Protection Authority (OEPA).

Following its consideration of the flora and vegetation review, the OEPA advised that the survey information provided for projects within the ANSIA are sufficient for the areas they cover. In relation to development on land that is not already zoned for development, the OEPA recommends further flora and vegetation surveys be carried out as follows:

- A Level I flora survey consistent with Guidance Statement 51 (EPA 2004) should be conducted across the areas that have not been mapped and/or ground-truthed. Vegetation mapping by Biota (2010a) and Outback Ecology Services (2010) (reported in Biota 2010b) should be extrapolated across the unsurveyed areas a desktop exercise. Ground-truthing should then be conducted for this mapping as well as the areas that were mapped by Biota (2010b) through aerial photography interpretation but were not ground-truthed.
- A targeted flora survey is required in the habitats likely to support the conservation significant flora identified in previous surveys.
- Surveys and ground-truthing should be conducted in the appropriate seasons.

The OEPA advice is provided in Appendix 1.

I.4.2.2 Terrestrial Fauna

A number of terrestrial fauna surveys and assessments have been undertaken within and adjacent to the ANSIA in recent years. The survey area boundaries for each of these flora and vegetation surveys are presented in Figure 3.



The following terrestrial fauna assessments provide some additional context on the terrestrial fauna within the ANSIA and at a regional level:

- Bamford Consulting Ecologists (Bamford) 2009a. Survey for Migratory Waterbirds in the Wheatstone LNG Project Area, November 2008 and March 2009. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Bamford Consulting Ecologists (Bamford) 2009b. Fauna Assessment BHP Billiton Petroleum Pty Ltd Macedon Gas Development Terrestrial Plant Site and Linear Infrastructure Corridor. Report prepared for URS Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2010c. Wheatstone Project Terrestrial Fauna Survey. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota). 2010d. Wheatstone Project Flora and Fauna Assessment Addendum. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2010e. Wheatstone Project Clay Pan Ephemeral Fauna Survey. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2010f. Wheatstone Project Subterranean Fauna Assessment. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd
- Biota Environmental Sciences (Biota) 2013. Desktop Review of the Proposed Onslow Micro-Siting Survey Area. Report prepared for Chevron Australia Pty Ltd
- ENV Australia Pty Ltd (ENV) 2012b. Ashburton North Strategic Industrial Area.
 Biological Desktop Review. Report prepared for The Planning Group
- ENV Australia Pty Ltd (ENV) 2012c. Ashburton North Strategic Industrial Area Fauna Assessment. Report prepared for The Planning Group
- Pendoley Environmental 2009. Marine Turtle Beach Survey, Onslow Mainland Areas and Nearby Islands, 25 January–6 February 2009. Report prepared for URS Australia Pty Ltd on behalf of Chevron Australia Pty Ltd.

In 2014, RPS undertook a review of the above terrestrial fauna assessments. The purpose of this review was to provide an assessment of the conservation significant terrestrial fauna and associated habitats identified as occurring or considered likely to occur within the ANSIA (RPS 2014b).



The outcome of the terrestrial fauna literature and desktop review is presented in Appendix 3 and summarised in Section 6.4. In summary, the literature and desktop review identified that the studies undertaken so far are considered adequate and that no further fauna surveys is required as part of the development of the Improvement Plan and Scheme for the ANSIA.

Preliminary Consultation with OEPA

Ahead of the ANSIA Improvement Scheme being referred to the EPA, preliminary advice was sought from the OEPA.

Following its consideration of the terrestrial fauna review, the OEPA advised that the survey information provided for projects within the ANSIA are sufficient for the areas they cover. In relation to development on land that is not already zoned for development, the OEPA recommends further fauna surveys are carried out as follows:

- A Level I fauna assessment is to be undertaken to map fauna habitats across the study area as recommended by the "Ashburton North Strategic Industrial area Biological Desktop Review" (ENV 2012b).
- A targeted Level 2 fauna survey is to be undertaken to determine the presence of any of the significant fauna species that are predicted by ENV (2012c) or RPS (2014b) as likely to occur.

The OEPA advice is provided in Appendix 1.

1.4.2.3 Hydrology

A number of hydrological assessments and water management strategies have been undertaken within the ANSIA in recent years. The following reports provide some additional context regarding the hydrology for the project area and the management measures required:

- BG&E 2011. Ashburton North Strategic Industrial Area Hydrological and Planning Study Summary. Report prepared for LandCorp
- BG&E 2012. Ashburton North Strategic Industrial Area Local Water Management Strategy. Report prepared for LandCorp
- ENV Australia Pty Ltd (ENV) 2010. Ashburton North Strategic Industrial Area -District Water Management Strategy. Report prepared for Chevron Australia Pty Ltd
- ENV Australia Pty Ltd (ENV) 2011. Ashburton North Strategic Industrial Area –
 Local Water Management Strategy. Report prepared for Chevron Australia Pty Ltd



- URS 2010a. Ashburton North Strategic Industrial Area Surface Water Studies.
 Report prepared for Chevron Australia Pty Ltd
- URS 2010b. Wheatstone Project Groundwater Studies. Report prepared for Chevron Australia Pty Ltd.

I.4.2.4 Site Context

In terms of previous planning and design work that has been undertaken for the ANSIA, the following documents have been drawn on to provide background information as well as context on the site's locality and the region.

- Taylor Burrell Barnett Town Planning and Design (TBB) 2011. Ashburton North Strategic Industrial Area Structure Plan. Report prepared for Chevron Australia Pty Ltd
- Taylor Burrell Barnett Town Planning and Design (TBB) 2012. Wheatstone Development Plan. Report prepared for Chevron Australia Pty Ltd
- The Planning Group (TPG) 2012. Ashburton North Strategic Industrial Area: Stage IB and IC Development Plan Report. Report prepared for LandCorp.
- Urbis 2013. Ashburton North Strategic Industrial Area: General Industrial Area –
 Eastern Portion Outline Development Plan. Report prepared for LandCorp
- Urbis 2014. Ashburton North Strategic Industrial Area: Background Review. Draft report prepared for LandCorp.



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2.0 LAND USE AND PLANNING CONTEXT

2.1 ANSIA Regional Overview

The ANSIA is located in proximity to the Onslow town site and surrounding activities. The location of the ANSIA boundary and Improvement Scheme in relation to the surrounding environment is depicted within Figure B.

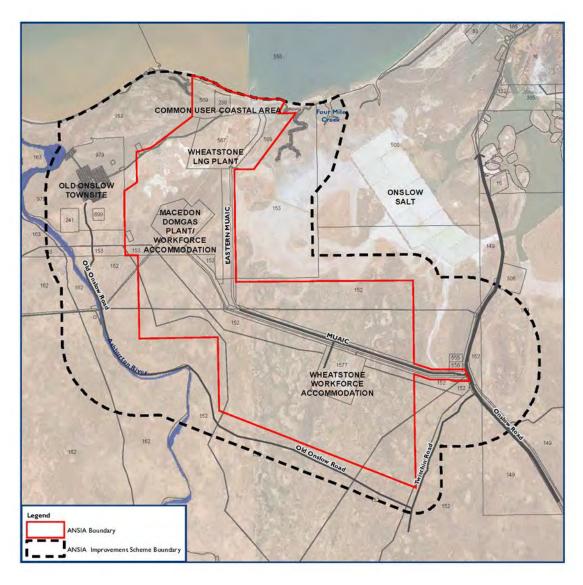


Figure B: ANSIA Improvement Scheme Location and Area

A summary of the existing development within the ANSIA is provided below.



Existing LNG Facilities / Workforce Accommodation Sites

Existing development within the ANSIA consists of the following:

- Macedon Domestic Gas Plant
- Wheatstone LNG Plant
- Wheatstone Construction Village
- Port and Common User Facility
- infrastructure associated with the existing facilities
- Macedon Access Road, Onslow Road, Old Onslow Road, Twitchin Road.

Old Onslow Town Site

The Old Onslow town site, within the western portion of the ANSIA is a permanent entry on the Register of Heritage Places (P3444 2006). The site also includes the remnants of the tramline and jetty that track through the north-western portion of the ANSIA site. The Old Onslow town site and associated community facilities can be accessed via Old Onslow Road.

Onslow Salt

Located directly adjacent to the ANSIA is the land under the control of the *Onslow Solar Salt Agreement Act 1992* (Onslow Salt). Onslow Salt is sensitive to changes in the hydrological conditions within the surrounding area. All developments within the surrounding hydrological catchment must be cognisant of the potential effects on Onslow Salt to ensure there are no adverse impacts. Accordingly, due regard must be given to the terms of the *Onslow Solar Salt Agreement 1992* and the activities of Onslow Salt in accordance with and as contemplated by or under that agreement.

2.2 Existing Land Use Zoning

Under the Shire of Ashburton's Town Planning Scheme No. 7 (TPS No. 7), the ANSIA is zoned as follows (Figure C):

- The Port of Ashburton is zoned Strategic Industry.
- The Wheatstone LNG Plant is zoned "Strategic Industry" and "Reserved Other Purpose Infrastructure".
- The Macedon Domestic Gas Plant and Future Industry area is zoned "Strategic Industry".
- The Multi-User Access and Infrastructure Corridor is reserved "Other Purposes Infrastructure".



- The Wheatstone Construction Village is zoned "Special Use".
- The General Industrial Development Areas are zoned "General Industry".
- The proposed Power Station and Desalination Plant is zoned "Rural".
- The surrounding environs are zoned "Rural" and reserve for "Conservation, Recreation and Natural Landscapes".

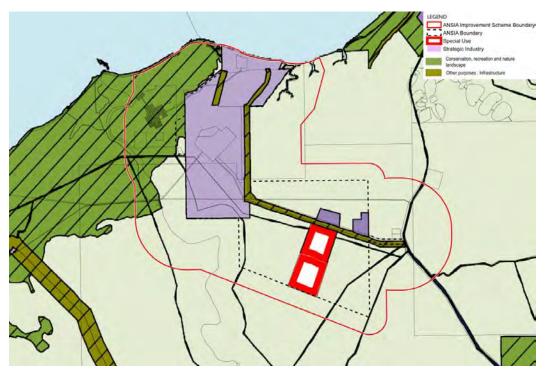


Figure C: Existing Land Use Zoning

TPS No. 7 will no longer apply to the ANSIA once the Improvement Scheme takes effect. The proposed Improvement Scheme framework is outlined in Section 2.4.

2.3 Planning Context

Significant investigation, technical assessments and documentation has been undertaken in order to establish and further develop the ANSIA. Work to date has primarily been for the purposes of providing a strategic industrial area that is suitable for hydrocarbon processing industries and support facilities, promoting the common use of infrastructure and industrial synergies. The framework has developed incrementally in order to reflect the varying timeframes associated with the establishment of the gas plants.



Historically the planning has produced:

- Scheme Amendments (9, 10, 11, 17 and 18) to the Shire of Ashburton Local Planning Scheme 7 to facilitate the rezoning of the land from "Rural" to "Strategic Industrial", "Industrial" and "Special Use" zones (Figure 2).
- ANSIA Structure Plan which provided the framework for the development of Stage I, including stages
 - Stage IA Wheatstone LNG Plant and Common User Coastal Area/Port and Multi User Infrastructure Access Corridors, and the Wheatstone Construction Village
 - Stage IB Macedon Domestic Gas Plant and Future Industry Areas
 - Stage IC General Industrial Areas. The ANSIA Structure Plan does not include provisions for the development of Stage 2, however it does incorporate principles for development that are intended to inform the development of a secondary Structure Plan over Stage 2.
- Wheatstone Development Plan providing refinement of the Structure Plan relating in particular to Chevron's Wheatstone gas plant, associated Multi-User Infrastructure Access Corridors (MUIAC) and Transient Workforce Accommodation (TWA) area as well as the Common User Coastal Area.
- ANSIA Stage IB and IC Development Plan provides the additional refinement for the Macedon Gas Plant, Secondary TWA and the General Industrial Area. It is noted that the Scarborough site, although within Stage IB, is not provided within this structure plan.
- Eastern General Industrial Area Outline Development Plan provides detailed planning for the General Industrial Area (Eastern Portion) in accordance with the overarching structure and development plans.

The ANSIA planning framework illustrates the proposed staging of the ANSIA with Figure D noting the hierarchy and time line of documentation. Consideration has been given to both the planning instruments and to associated technical investigation/reports in the preparation of the Improvement Scheme.



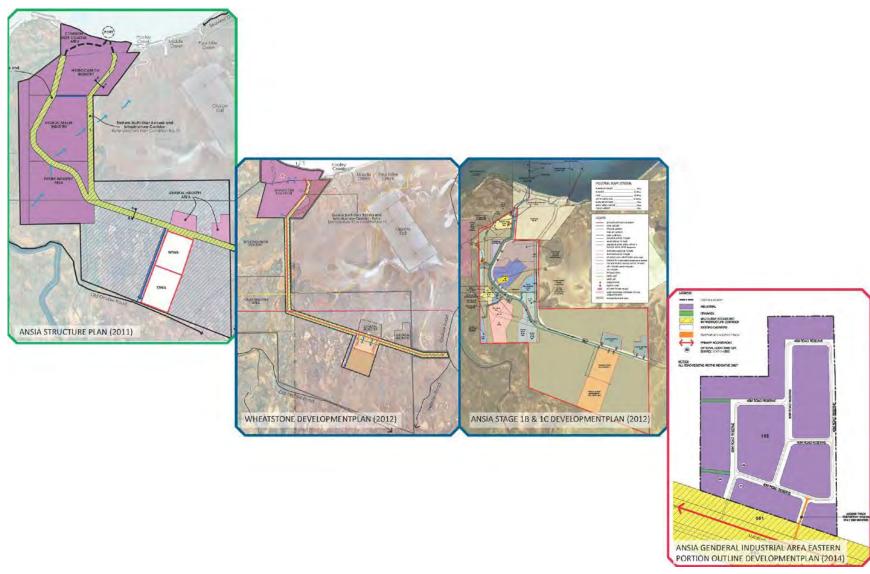


Figure D: ANSIA Current Planning Framework



The following sections outline the relevant objectives and provisions of the ANSIA planning documentation. An initial assessment of where these provisions fit within the Improvement Plan, Improvement Scheme and Improvement Scheme Guide Plan framework or where provisions may need to be reconsidered is included.

2.4 Improvement Plan No. 41

Improvement Plans are "strategic instruments" used by the WAPC to facilitate the development of land in areas identified as requiring special planning. An Improvement Plan authorises the making of an Improvement Scheme, and sets out the area and objectives of that Improvement Scheme.

The purpose of the Improvement Plan is to establish the strategic planning and development intent, to provide for a framework endorsed by the WAPC, and to provide guidance for the preparation of subsequent planning documentation and approvals.

Improvement Plan No. 41 was gazetted on 13 March 2015, thus providing the head of power for the development of the Improvement Scheme.

The Improvement Plan sets out the following objectives to guide the development of the Improvement Scheme:

- I. To create a strategic industrial estate comprising major hydrocarbon processing industries and synergistic services and/or facilities with viable port access.
- 2. Ensure the safe and efficient use of land for the long-term industrial development of a strategic industrial area of regional, state and national significance.
- 3. To provide an internationally competitive industrial estate that offers a layout designed to facilitate and encourage industry synergies, functional transport links and where possible, the sharing of infrastructure networks and corridors.
- 4. To minimise and mitigate adverse impacts on the surrounding land, the terrestrial and marine environment, and the Onslow community.
- 5. To ensure the appropriate separation and layout of land uses through appropriate internal and external buffers to prevent incompatible or conflicting land uses.

2.5 Improvement Scheme

Improvement Schemes are "statutory instruments" used by the WAPC to control development within an Improvement Plan area. An Improvement Scheme removes land from the local planning scheme. As such, the Shire of Ashburton's Local Planning Scheme would not have effect once the Improvement Scheme comes into effect.



2.5.1 Scheme Boundary

The boundary of the ANSIA Improvement Scheme is aligned with that set out in Improvement Plan 41 and shown the Scheme Map.

The boundary of the ANSIA Improvement Scheme is illustrated in Figures 1 and 5.

The rational for the ANSIA Improvement Scheme area inclusive of the buffers are illustrated in Figure 4. The Improvement Scheme boundary extends beyond the strategic industrial area previously depicted within local and State government documentation. The proposed Scheme Area includes separation areas for the protection of industrial amenity and the ability of strategic industrial areas to develop to their full potential, as well as ensuring sensitive receptors are in turn protected from industrial development. These separation distances are as follows:

- A 3 km separation distance was applied to the strategic industry zone of the ANSIA, recognising the type and form of activity that is to be established in this area, ensuring these can be adequately established, operate efficiently and be certain that their operations will not be affected by the encroachment of sensitive receptors.
- A 3 km separation distance has been applied to the proposed power station and desalination plant.
- A I km separation distance has been applied around the workforce accommodation in order to protect the sensitive receptor from the potential of incompatible development within the surrounding area.

2.5.1.1 Internal Buffers

The ANSIA includes a sensitive land use in the form of the workforce accommodation area. Identified within the ANSIA Structure Plan as the Land Use Sensitivity Buffer Area, this provides a 1,000 m (1 km) buffer surrounding the workforce accommodation sites (Figure 4).

The aim of this buffer is to ensure land uses will not adversely affect the healthy, safety or amenity of the workforce accommodation whilst it exists. In addition to the buffer, a 1,000 m separation for sensitive uses is imposed between the workforce accommodation and the proposed GIA to the north.

2.5.1.2 External Buffers

The Strategic Industrial Area Buffer has been established with regard to planning and environmental criteria, being:

- noise at sensitive land uses being 35 dB(A)
- risk at a risk level of one in a million per year or less
- air quality.



The modelling for the above environmental criteria in relation to known users within Stage I noted that a boundary of 3 km provided an acceptable limit for the criteria.

The aim of the Strategic Industrial Area Buffer is to ensure that no sensitive receptors as defined by the State Industrial Buffer Policies are located within proximity to the ANSIA. Existing recreational land uses are acknowledged to be located within the buffer – the 5 Mile Pool and Ashburton River informal camping sites and the Old Onslow town site; however, a review of these uses as part of the preparation of the ANSIA structure plan has determined that they are not considered sensitive receptors under the policy.

2.5.1.3 Additional Buffer Considerations

In addition, since the adoption of the ANSIA Structure Plan other land uses are contemplated that require buffer considerations including:

- the development of the ANSIA Stage I incorporating a 3 km buffer based on the principles established as part of the Stage I ANSIA Structure Plan
- the development of the ANSIA Stage 2 and the GIAs likely to contain much less intensive uses
- the Horizon Power dual fuel power station (LNG and diesel fuel) and associated infrastructure located adjacent to Onslow Road and the MUIAC, including a 3 km buffer
- the proposed desalination plant located adjacent to the proposed power station, which will be located within the 3 km power station buffer and therefore not requiring a separate buffer to be established.

2.5.2 Improvement Scheme Zones

In establishing the new land use zones within the Improvement Scheme (Figure 5), consideration has been given other existing and proposed zones across Western Australia in order to achieve a level of consistency as far as practicable. In the context of ANSIA, consideration has needed to be given to the following matters:

- The need to establish and maintain separation distances between the strategic and general industrial activities and sensitive receptors, both inside and outside of the scheme area. The primary intention of the zone is to restrict development to ensure the industrial amenity of the industry zones is protected.
- The unique infrastructure arrangements associated with strategic industry, effectively negating the need to set aside land as public reserves on the scheme map.



The ANSIA Improvement Scheme includes the following zones (Figure 5):

• Strategic Industry Zone reflects the intended use of the ANSIA as a hydrocarbon processing precinct. The zone covers the Port land and incorporates the existing developments by BHBPB and Chevron Australia.

An additional use has been incorporated into the Strategic Industry Zone to enable the continued use of the Brolga construction workforce accommodation site by Chevron Australia Pty Ltd to a maximum period of 31 December 2018 to support the growing workforce required to construct the Wheatstone LNG Project (subject to maintaining current compliance with appropriate and relevant regulatory requirements).

- General Industry Zone includes the eastern and western general industrial areas, generally intended to provide support to the larger developments within the strategic industry zone.
- Industry Protection Zone provides for the protection of the industrial amenity within the active industrial areas. The zone primarily encompasses the area identified as the separation distance from the strategic industry, general industry and workforce accommodation.
- Infrastructure Zone provides for the infrastructure and roads within the MUAIC, and the proposed power station and desalination site adjacent to Onslow Road.
- Workforce Accommodation Zone provides for the accommodation of workers engaged in the construction of developments within the ANSIA.
- Special Use Zone provides for the accommodation of workers employed in the operational and maintenance phase of projects within the ANSIA. The Special Use zone includes conditions that facilitate the continued use of the northern portion of the site for laydown, storage and other purposes including Industry noxious uses at the discretion of the WAPC and on the advice of the agencies administering the Environmental Protection Act 1986.

2.5.3 Improvement Scheme Text/Provisions

The provisions of the Improvement Scheme have been prepared on the basis of the Model and Deemed Provisions (MDP), as established in the *Planning and Development* (Local Planning Schemes) Regulations 2015, to the extent appropriate and relevant. The Improvement Scheme has been customised in response to the unique context and development requirements of the ANSIA, along with the aim of streamlining and clarifying the planning framework.



2.5.4 ANSIA Guide Plan

The improvement scheme seeks to establish provisions allowing for the establishment and operation of a guide plan, including amendments as necessary over time. The Guide Plan forms an appendix to the Improvement Scheme. The Guide Plan is included as an Appendix to the Improvement Scheme and seeks to set out specific development requirements, based on the zoning for specific areas within the ANSIA.

The Guide Plan is intended to provide a broad framework and be flexible in nature, enabling applications to be considered on their merits by the WAPC, having regard for the advice of relevant authorities. The specific requirements of the environmental management plans will be included in the Guide Plan.

2.6 Improvement Scheme Report

The purpose of the Improvement Scheme report is to provide the context, rationale and explanatory commentary in outlining where the planning framework originated, the key considerations in establishing the Improvement Scheme framework including the Guide Plan, the rationale for decisions made and the direction taken during the preparation of the scheme.

2.7 Past Environmental Assessment Context

2.7.1 Strategic Industry and Industry Protection

2.7.1.1 Shire of Ashburton TPS No. 7 Amendment No. 9

In February 2010, the Shire of Ashburton formalised the location of the ANSIA by initiating Amendment No. 9 to TPS No. 7 in order to classify the designated area as a "Special Control Area" (SCA) and establish clear criteria to progress future scheme amendments and development proposals (Shire of Ashburton 2010).

Amendment No. 9 was referred to the EPA for its consideration under Section 48 of the EP Act. In March 2010, the EPA set a level of assessment at "Scheme Amendment Not Assessed – Advice Given (No Appeals)".

In summary, the EPA advised that due to sufficient information not being available at that time regarding the nature of the environmental impacts arising from the implementation of Amendment No. 9, the following environmental issues were not assessed, flora and vegetation, groundwater, surface water, terrestrial fauna, terrestrial short range endemic (SRE) fauna, soils and landform, noise, air quality and Aboriginal cultural heritage.



The EPA provided advice regarding the environmental issues listed above and future studies that may be required. In addition to this, the EPA recommended further consideration of the need to assess future proposals (i.e. subsequent rezoning, Development Guide Plan, Structure Plan, subdivision or development) when more information is available.

2.7.2 Strategic Industrial, Infrastructure, Workforce Accommodation and Special Use

2.7.2.1 Wheatstone LNG Plant

The Wheatstone LNG Plant is a joint venture between Australian subsidiaries of Chevron, Kuwait Petroleum Exploration Company, Apache and others, and commenced construction in December 2011. It includes an onshore facility located at ANSIA. The project includes two LNG trains with a combined capacity of 8.9 million tonnes per annum and domestic gas plant.

The environmental impact assessment process for the Wheatstone LNG Plant commenced in 2008 (Figure 2). The EPA assessed numerous environmental factors when considering the proposal, including sub-tidal benthic habitat, intertidal benthic primary producer habitat, marine fauna, flora, vegetation, greenhouse gases, air emissions, recreation and aesthetics, and tourism and fishing related industry. The EPA recommended approval for the project in June 2011 (EPA Report 1404), subject to a number of environmental conditions that would guide construction and operation of the project (EPA 2011a).

Subsequently, the Minister for the Environment approved the development subject to environmental conditions (Ministerial Statement 873) being imposed on the development to ensure the EPA's environmental objectives could be met. The environmental conditions imposed included (but not limited to):

- conservation significant marine fauna interaction management
- dredge and dredge spoil monitoring and management
- state of marine environment surveys
- trunkline installation monitoring and management
- underwater noise monitoring
- mangrove and algal mat and tidal creek management
- marine fauna management
- introduced marine pest management
- greenhouse gas abatement program
- residual impacts and risk management measures.



In September 2011, the Commonwealth granted environmental approval (EPBC 2008/4469) to the project subject to a number of measures to mitigate environmental impacts, which included a number of management plans relating to:

- environmental protection
- dredging and spoil disposal
- marine fauna
- coastal processes
- marine discharge
- oil spills
- greenhouse gas abatement
- drilling and blasting and decommission.

Shire of Ashburton TPS No. 7 Amendment No. 10 (Stage 1A)

In order to facilitate the Wheatstone LNG Plant, Amendment No. 10 was prepared as part of the "Planning Framework" for the ANSIA. The Amendment resulted in the (TBB 2011):

- rezoning of Lots 238, 509, 519, 530, 535 and 536 and Part Lots 152, 153, 301, 302, 510 and 524 from "Rural" zone and "Conservation, Recreation and Natural Landscapes" reserve to "Strategic Industry" zone and "Other Purposes Infrastructure" reserve
- rezoning of Part Lot 152 Onslow Road from "Rural" zone to "Special Use –
 Transient Workforce Accommodation" zone
- insertion of provisions relating to Special Use 2 into Schedule 2.

Amendment No. 10 and accompanying ANSIA Structure Plan was referred to the EPA for its consideration under Section 48 of the EP Act. In January 2011, the EPA set a level of assessment at "Scheme Amendment Not Assessed – Advice Given (No Appeals)".

The EPA advised that given its current formal assessment of the Wheatstone LNG Plant there is an expectation that all environmental issue would be dealt through that assessment and any final planning approvals to await completion of the assessment as well as be consistent with the outcome of the EPA's assessment.

2.7.2.2 Macedon Domestic Gas Plant

The Macedon Domestic Gas Plant (developed and operated by BHPB) was officially commissioned in September 2013, following a construction period of two years. It includes four offshore production wells and an onshore gas treatment plant in the ANSIA.



The environmental impact assessment process for the Macedon Domestic Gas Plant commenced in 2008 (Figure 2). The EPA assessed numerous environmental factors when considering the proposal, including marine habitats and fauna, terrestrial flora and fauna, and atmospheric emissions (including greenhouse gases).

The EPA recommended approval for the project in July 2010 (EPA Report 1360), subject to a number of environmental conditions that would guide construction and operation of the project (EPA 2010a).

Subsequently, the Minister for the Environment approved the development subject to environmental conditions (Ministerial Statement 844) being imposed on the development to ensure the EPA's environmental objectives could be met. The environmental conditions imposed included marine fauna management, introduced marine pest management, rehabilitation of terrestrial vegetation, terrestrial fauna management, monitoring benthic primary producer habitat, greenhouse gas abatement and decommissioning.

Shire of Ashburton TPS No. 7 Amendment No. 17 (Stage 1B)

In order to unlock the surrounding area for strategic industrial development, Amendment No. 17 was prepared as part of the "Planning Framework" for the ANSIA. The Amendment resulted in the (TPG 2012a):

- rezoning of all or portions of Lots 152, 153, 350, 505, 508, 518, and Lots 500, 506, 507, 509, 519,520, 540 and 541 from "Rural" zone and "Conservation, Recreation and Natural Landscapes" reserve to "Strategic Industry" zone
- reserving a portion of Lot 152 for "Other Purposes Infrastructure"
- rezoning a portion of Lot 152 from "Rural" zone to "Special Use Transient Workforce Accommodation" zone.

Amendment No. 17 was referred to the EPA for its consideration under Section 48 of the EP Act. In April 2012, the EPA set a level of assessment at "Scheme Amendment Not Assessed – Advice Given (No Appeals)".

In summary, the EPA identified the relevant environmental issues to be flora and vegetation, surface water, acid sulfate soils, noise, light, air quality and aboriginal heritage. The EPA provided specific advice and recommendations on the following environmental issues:

■ Flora and Vegetation: Due to the potential for direct impacts on priority flora within the amendment area, the EPA recommended that all future development proposals be developed in consultation the Department of Parks and Wildlife (DPaW) (then Department of Environment and Conservation (DEC)) to provide for the protection of priority flora and that vegetation clearing is minimised where possible.



- Acid Sulfate Soils (ASS): Due to potential ASS risk, the EPA recommended that all future development proposals provide detailed ASS and dewatering management Plans, prepared in consultation with the Department of Environmental Regulation (DER) (then DEC), prior to any construction works.
- Aboriginal Heritage: Due to the presence of Aboriginal heritage sites, the EPA recommended that the Responsible Authority consult with the Department of Aboriginal Affairs (DAA) (then Department of Indigenous Affairs).

However, the EPA advised that due to sufficient information not being available at that time regarding the nature of the environmental impacts arising from the implementation of Amendment No. 9, the following environmental issues were not assessed, surface water, noise, light and air quality.

In particular, the EPA recommended that prior to the referral of future industrial development, proposals should take into account potential noise, light and air quality impacts on nearby turtle nesting sites and the transient workforce accommodation, and that cumulative impact of the ANSIA should also be considered.

Subsequently, the EPA recommended further consideration of the need to assess future proposals (i.e. subsequent rezoning, Development Guide Plan, Structure Plan, subdivision or development) when more detailed environmental information is available.

2.7.3 General Industry Zone

2.7.3.1 Shire of Ashburton TPS No. 7 Amendment No. 18 (Stage 1C)

Consistent with the ANSIA Structure Plan, Amendment No. 18 sought to rezone Part Lot 152 from the "Rural" zone to "Industry" zone. The land subject to this Amendment falls within the General Industry Area (GIA) precinct identified in the ANSIA Structure Plan. The primary purpose of this rezoning is to ensure the opportunity for a range of industrial uses that will service the ANSIA and the broader Onslow area (TPG 2012b).

Amendment No. 18 was referred to the EPA for its consideration under Section 48 of the EP Act. In April 2012, the EPA set a level of assessment at "Scheme Amendment Not Assessed – Advice Given (No Appeals)". In summary, the EPA advised that due to sufficient information not being available to assess the potential environmental impacts of specific future industrial proposals.

The environmental factors for noise and air quality were deferred to ensure the EPA the opportunity (if necessary) to assess future industrial proposals within the GIAs that may have the potential to cause significant environmental impacts and/or may have the potential to cause significant noise or air quality impacts on the nearby workforce accommodation area.



2.7.4 Infrastructure Zone

2.7.4.1 Onslow Power Infrastructure Upgrade Project

The Onslow Power Infrastructure Upgrade Project (OPIUP) will involve the construction of a new dual fuel natural gas and diesel-fired power station and associated infrastructure, a double-circuit 33 kV transmission line and a zone substation (Horizon Power 2014).

In July 2014, Horizon Power (the proponent) referred the proposed development to the EPA for its consideration under Section 38 of the EP Act. The proponent advised the EPA that the potential environmental impacts of the proposal can be sufficiently managed under Part V of the EP Act, whereby:

- Emissions and discharges can be managed accordingly under a Works Approval and Licence (if required).
- Impact to vegetation and flora can be managed accordingly under a Clearing Permit.

In August 2014, the EPA set a level of assessment at "Not Assessed – No Advice Given".

2.8 Future Industrial Development and Buffers

Within the ANSIA, in particular the Strategic Industry Zone, which accommodates current and future hydrocarbon processing activities, each industrial proposal will need to assess and accommodate its own **risk** buffer within its leasehold in accordance with the EPA's recommended separation distances.

For heavy industrial proposals within the Strategic Industry Zone a specific environmental assessment for example of air quality, noise and human health risk will need to be undertaken in consultation with the EPA as part of a separate referral and assessment under Section 38 of the EP Act. This assessment would also delineate separation distances between industrial developments within the ANSIA.

Table 4 provides a general guide to the EPA's recommended separation distances.

There are several environmental provisions under Part V of the EP Act, including pollution and environmental harm offences and prescribed premises, works approvals and licences, notices, orders and directions and noise provisions; in addition to the Environmental Protection (Noise) Regulations 1997.

Certain industrial premises with significant potential to cause emissions and discharges to air, land or water (for example chemical manufacturing, electric power generation bulk storage of chemicals, processing/beneficiation of metallic or non-metallic ore) are known as "prescribed premises" and trigger regulation under the EP Act.



"Prescribed premises" are engaged in activities that produce emissions and discharges that have significant risk to the environment and trigger the regulation of management through a licence. Works approvals and licences are issued by DER with conditions that apply to specific premises and are intended to prevent or minimise the emissions and discharges of waste to the environment.

The spatial outcome for the ANSIA particularly in the Strategic Industry zones is each industrial development will require a buffer from neighbouring industries. This outcome will create "pods" of industrial development(s), connected by roads and common infrastructure within the ANSIA landscape.

Table 4: EPA Recommended Separation Distances between Industrial and Sensitive Land Uses (EPA 2005)

Land Use	EPA Recommended Separation
Ammonium nitrate import/export	Case by case
Chemical blending	300 m-500 m (dependent on size and type of chemicals involved)
Fuel storage	300 m-500 m (dependent on type of fuel stored and size)
Electrical power generation	3000 m-5000 m (dependent on location and size)
Wastewater treatment	Buffer studies are in progress to determine appropriate separation distances



3.0 LEGISLATIVE FRAMEWORK

3.1 State Legislation

3.1.1 Environmental Protection Act 1986 (EP Act)

The EPAct is the key legislative tool for environmental protection in Western Australia. The EPA undertakes the environmental impact assessment of some proposals and schemes referred to it under Part IV of the EP Act. Environmental impact assessment is a systematic and orderly evaluation of a proposal and its impact on the environment. The assessment includes considering ways in which the proposal, if implemented, could avoid or reduces any impact on the environment.

The EP Act is administered by the EPA and the Minister for the Environment.

The ANSIA Improvement Scheme will be referred and assessed by the EPA in accordance with Section 48 of the EP Act and the *Planning and Development Act 2005*.

Proponents of industrial developments in the Strategic Industry Zone (for example ammonia processing plant) will require a separate referral assessment by the EPA under Section 38 of the EP Act. These industrial developments may require specific assessment of environmental factors such as air quality, human health, noise and separation distances.

Industrial premises have the potential to pollute or otherwise impact on the quality of our air, land or water. The DER is responsible for regulating industrial emissions and discharges to the environment through a works approval and licensing process.

The DER has responsibility under Part V of the EP Act for the licensing and registration of prescribed premises, the issuing of works approvals and administration of a range of regulations. The DER also monitors and audits compliance with works approvals, licence conditions and regulations.

3.1.2 Relevant Legislation and Regulations

The proposed ANSIA will be required to comply with the requirements of other relevant state legislation and regulations. Table 5 provides a summary of the key state legislation and regulations relevant to the future industrial development.



Table 5: Key State Legislation

Key Legislation	Responsible Government Agency	Aspect	
Aboriginal Heritage Act 1972	Department of Aboriginal Affairs	Archaeological and ethnographic heritage	
Aboriginal Heritage Regulations 1974	Department of Aboriginal Affairs	Archaeological and ethnographic heritage	
Agricultural and Related Resources Protection Act 1976	Department of Agriculture	Weeds and feral animals	
Bush Fires Act 1954	Department of Fires and Emergency Services	Bush fire control	
Conservation and Land Management Act 1984	Department of Park and Wildlife Department of Agriculture	Flora and fauna / habitat / weeds / pests / diseases	
Conservation and Land Management Regulations 2002	Department of Park and Wildlife Department of Agriculture	Flora and fauna / habitat / weeds / pests / diseases	
Contaminated Sites Act 2003	Department of Environmental Regulation	Management of contaminated soils and water	
Environmental Protection Act 1986	Environmental Protection Authority	Under Part V, air pollution or emission requires to be:	
	Department of Environmental Regulation	permitted under a "works approval" or "licence"	
		 as a result of an emergency or other exempt activity; or 	
		 permitted under an approval granted by the Minister for the Environment. 	
Environmental Protection Act 1986	Environmental Protection Authority	Part IV – Environmental Impact Assessment	
	Department of Environmental Regulation	Part V – Works Approvals and Licences	
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	Department of Environmental Regulation	Clearing of native vegetation	
Planning and Development Act 2005	Department of Planning	Structure planning and subdivision approval	
Rights in Water and Irrigation Act 1914	Department of Water	Governs management of the use, service and health of water and watercourses (including beds and banks). Water licensing is required in all proclaimed areas and for all artesian groundwater wells throughout the state.	
Wildlife Conservation Act 1950	Department of Parks and Wildlife	Wildlife conservation and protection	



3.1.3 Relevant Standards, Guidelines and Policies

The ANSIA is subject to compliance with applicable standards and guidelines developed by the EPA to assist proponents and the public to understand the minimum requirements for the protection of elements of the environment that the EPA expects to be met during the assessment process. The following table details the key EPA standards, guidelines and state planning policies relevant to future industrial development.



Table 6: Relevant EPA Standards, Guidelines and State Planning Policies

Document	Description		
EPA Position Statements			
Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia (EPA 2000)	Provides an overview of the EPA's position on the clearing of native vegetation in Western Australia.		
Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a)	Outlines the principles in relation to the provision of information in the assessment of biodiversity and provides information on the importance of biodiversity and the expectations of the EPA in the provision of survey data.		
Position Statement No. 4: Environmental Protection of Wetlands (EPA 2004a)	Provides a summary of the aspects regarding environmental protection of wetlands in Western Australia that the EPA considers being important in guiding its decisions and advice to government on the matters of environmental protection.		
EPA Environmental Assessment Guidelines			
Environmental Assessment Guideline No. 5: Protecting Marine Turtles from Light Impacts (EPA 2010b)	Sets out guidance on an array of approaches available for avoiding, reducing, managing and mitigating light impacts on marine turtles to be considered when preparing documentation relevant to the EIA process and during the implementation of proposals or planning schemes.		
	Provides alternative methods for the avoidance and management of light impacts that can be applied using a risk-based approach and by applying best practice methods.		
Environmental Assessment Guideline No. 8: Environmental factors and objectives (EPA 2015a)	Outlines the EPA's environmental principles, factors and objectives, and describes the framework to be applied and how this links to EPA guidance.		
	Outlines the EPA's expectations for applying environmental principles, Government environmental policies, factors, objectives and guidance through environmental impact assessment.		
Environmental Assessment Guideline No. 9: Application of a significance framework in the environmental impact assessment process (EPA 2015b)	Describes how the EPA makes decisions, throughout the entire environmental impact assessment process on the likely significance of impacts of a proposal, using a risk based approach.		
Environmental Assessment Guideline No. 12: Consideration of subterranean fauna (EPA 2013)	Sets out the EPA's preferred approach for the consideration of subterranean fauna in environmental impact assessment.		
Environmental Assessment Guideline No. 13: Consideration of environmental impacts from noise (EPA 2014a)	Assist in understanding how the EPA considers the impacts from noise emissions through the environmental impact assessment process.		



Document	Description		
EPA Guidance Statements			
Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (EPA 2005)	Provides advice on the use of generic separation distances (buffers) between industrial and sensitive land uses to avoid conflicts between incompatible land uses.		
Guidance Statement No. 6: Rehabilitation of Terrestrial Ecosystems (EPA 2006)	Provides guidance to ensure the return of biodiversity in rehabilitated areas by increasing the quality, uniformity, and efficiency of standards and processes for rehabilitation of native vegetation in Western Australia and to allow more effective monitoring and auditing of outcomes.		
Guidance Statement No. 12: Guidance Statement for Minimising Greenhouse Gas Emissions (EPA 2002b)	Addresses the minimisation of greenhouse gas emissions from significant new or expanding operations.		
Guidance Statement No. 20: Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009)	Addresses the general standards and a common framework including risk-based assessment for the sampling and assessment of short-range endemic invertebrate fauna for environmental impact assessment in Western Australia.		
Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA 2008)	Provides information and advice to assist land use planning and development processes to protect, conserve and enhance the environment.		
	Describes the processes the EPA may apply under the EP Act to land use planning and development in Western Australia, and the environmental impact assessment process applied by the EPA to schemes.		
Guidance Statement No. 41: Aboriginal Heritage Assessment (EPA 2004b)	Provides guidance on the EPA's position on the assessment of Aboriginal heritage and information that the EPA will consider when assessing proposals where Aboriginal heritage is a relevant environmental factor.		
Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004c)	Provides guidance and information on the EPA's expected standards and protocols for terrestrial flora and vegetation surveys to environmental consultants and proponents.		
Guidance Statement No. 55: Implementing Best Practice in Proposals submitted to the Environmental Impact Assessment Process (EPA 2003)	Provides guidance on the EPA's position on the use of best practice to protect the environment, and the approach that the EPA will take when assessing best practice implementation in proposals.		
Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004d)	Provides guidance and information on the EPA's expected standards and protocols for terrestrial flora and vegetation surveys to environmental consultants and proponents.		



Document	Description		
EPA Bulletins			
Environmental Protection Bulletin No. 1: <i>Environmental Offsets</i> (EPA 2014b)	Clarifies how the EPA will consider offsets through the environmental impact assessment process.		
Environmental Protection Bulletin No. 16: Minor or preliminary works and investigation work (EPA 2011b)	Clarifies what information a proponent needs to submit to the EPA if it wants the EPA's consent to undertake minor or preliminary works.		
Environmental Protection Bulletin No. 18: Sea level rise (EPA 2012)	Sets out the EPA's expectations for environmental impact assessment with respect to sea level rise.		
State Planning Policies			
State Planning Policy 2.6: State Coastal Planning Policy (WAPC 2006a)	Provides guidance for decision-making within the coastal zone including managing development and land use change; establishment of foreshore reserves; and to protect, conserve and enhance coastal values.		
State Planning Policy 2.9: Water Resources (WAPC 2006b)	Provides clarification and additional guidance to planning decision-makers for consideration of water resources in land use planning strategy.		
State Planning Policy 3.7 (Draft): Planning for Bushfire Risk Management (WAPC 2014)	Assist in reducing the risk of bushfire to people, property and infrastructure by taking a risk minimisation approach to development proposed in bushfire-prone areas.		
State Planning Policy 4.1 (Draft): State Industrial Buffer (Amended) (WAPC 2009a)	The policy applies state wide, to planning decision-making, and proposals which seek to provide for new industrial areas and uses, and essential infrastructure, sensitive land uses in proximity to existing industrial areas.		
State Planning Policy 5.4: Road and Rail Transport Noise and Freight Considerations in Land Use Planning (WAPC 2009b)	The policy aims to promote a system in which sustainable land use and transport are mutually compatible.		



3.2 Commonwealth Legislation

3.2.1 Environment Protection and Biodiversity Conservation Act 1999

The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) protects Matters of National Environmental Significance (MNES), and is administered by the Commonwealth Minister of the Environment. If an action is likely to have a significant impact on any MNES a referral to the Commonwealth Department of the Environment (DotE) is required.

MNES that relate to terrestrial fauna potentially impacted by future development within the ANSIA are:

- listed threatened species (Vulnerable, Endangered, Critically Endangered and Extinct in the Wild)
- migratory species protected under international agreements.

It is recommended that future proponents consider undertaking a significant impact test against the Commonwealth Significant Impact Guidelines I.I – Matters of National Environmental Significance prior to determining whether to refer a proposal to the Commonwealth.



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4.0 STATUTORY FRAMEWORK

4.1 Improvement Scheme

The WAPC will be the responsible authority for implementing the Improvement Scheme, and will be responsible for the Guide Plan and specific planning policies prepared under the terms of the scheme. The WAPC's primary role will be to receive, assess and determine applications for planning approval within the ANSIA.

The Improvement Scheme gives statutory effect to the objectives and intentions set out within the Improvement Plan by:

- establishing zones and reserves along with associated land use permissibility's within those zones
- establishing criteria for the assessment of industrial synergy
- providing guidance for land subdivision
- establishing site and development requirements
- stipulating environmental management requirements
- providing for further planning instruments to guide decision-making.

Additionally, to provide further guidance on any planning or development related matters within the ANSIA, the Improvement Scheme enables the WAPC to establish Planning Policies.

4.1.1 Zoning

The boundary of the ANSIA Improvement Scheme is as illustrated in Figure 5. The Scheme includes the following zones:

- Strategic Industry Zone
- General Industry Zone
- Infrastructure Zone
- Workforce Accommodation
- Industry Protection Zone
- Special Use Zone.



4.1.2 **S**cheme Text

At a future time when the nature and land requirements for industrial development(s) are more comprehensively known (i.e. detailed planning design/subdivision stage) the developments will be subject to the following environmental Scheme Provisions (Table 7). The specific requirements of the environmental management plans will be included in the Guide Plan.

Table 7: ANSIA Development Requirements - Improvement Scheme and Guide Plan

Zone	Improvement Scheme (Part 4 of Text)	Guide Plan (To be Appended to Scheme Text)
Strategic Industry	If applicable, scheme text to set out environmental conditions applicable to the scheme as a result of an assessment carried out under the Environmental Protection Act 1986 Part IV Division 3. If no environmental conditions apply, the scheme text will state, "There are no environmental conditions imposed under the Environmental Protection Act 1986 that apply to this scheme".	All planning applications or applications for subdivision within the Strategic Industry zone shall be referred to the Environmental Protection Authority for assessment under Section 38 of the Environmental Protection Act 1986 (WA). Subdivision and development shall be in accordance with the following environmental requirements (as relevant): (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan (d) Terrestrial Weed Management Plan (e) Marine Turtle Baseline Lighting Survey and Design Guidelines (if required) (f) Water Management Plan (g) Acid Sulfate Soil and Dewatering Management Plan (i) *Noise and Air Quality Management Plan Subdivision and development shall be in accordance with the following environmental requirements (as relevant) to the satisfaction of the Commission: (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan (d) Water Management Plan
Infrastructure Zone		(a) Fire Management Plan(b) Construction Environmental Management Plan(c) Water Management Plan
Workforce Accommodation / Special Use		Subdivision and development shall be in accordance with the following environmental requirements (as relevant) to the satisfaction of the Commission: (a) Fire Management Plan (b) Construction Environmental Management Plan (c) Mosquito Management Plan
		(d) Water Management Plan

^{*}due regard shall be given to any:

(i) Any applicable operating licence granted under Part 5 of the EP Act.

(ii) Any previous advice provided by the Environmental Protection Authority as a result of Section 38 and 48 Referrals.



4.2 Guide Plan

The specific requirements of the environmental management plans will be included within the Guide Plan.

Construction Environmental Management Plan

The objectives of a Construction Environmental Management Plan are to minimise potential impacts on surface water hydrology, soils and geomorphology.

The plans are also required to address:

- potential impacts to conservation significant terrestrial flora, vegetation and fauna outside the clearing areas, and to mitigate impacts through flora and vegetation management strategies in conjunction with weed control and quarantine measures
- noise and dust emissions (air quality) during the construction phase.

Plans are expected to include:

- a) Schedule of construction activities.
- b) Details of the construction methods to be used.
- c) Objectives and targets.
- d) Environmental management.
- e) Environmental training and inductions.
- f) Environmental monitoring, contingencies and reporting, and stakeholder consultation.

Applications for planning approval within the strategic and industrial zones are required to be supported by a Construction Environmental Management Plan, addressing matters relevant to the nature of the particular proposal, as required by the Improvement Scheme.

The plan is to be submitted to the WAPC for approval (on advice from the DPaW and DER) in accordance with the Improvement Scheme.



Terrestrial Flora and Vegetation Surveys (if required e.g. in the Industry Protection Zone)

Applications for planning approval on land that has not been previously surveyed are required to be supported by a terrestrial flora and vegetation survey. The survey will be carried out as follows, on the advice from the DPaW:

- A Level I flora survey consistent with Guidance Statement 51 (EPA 2004) should be conducted across the areas that have not been mapped and/or ground-truthed. Vegetation mapping by Biota (2010a) and Outback Ecology Services (2010) (reported in Biota 2010b) should be extrapolated across the unsurveyed areas a desktop exercise. Ground-truthing should then be conducted for this mapping as well as the areas that were mapped by Biota (2010b) through aerial photography interpretation but were not ground-truthed.
- A targeted flora survey is required in the habitats likely to support the conservation significant flora identified in previous surveys.
- Surveys and ground-truthing should be conducted in the appropriate seasons.

If any conservation significant flora and/or vegetation are identified through these surveys, a Terrestrial Flora and Vegetation Management Plan shall be prepared to the satisfaction of the WAPC (on advice from the DPaW).

Terrestrial Fauna Survey (if required e.g. in the Industry Protection Zone)

Applications for planning approval on land that has not been previously surveyed are required to be supported by a fauna survey. The survey will be carried out as follows, on the advice from the DPaW:

- a Level I fauna assessment to be undertaken to map fauna habitats across the study area as recommended by the "Ashburton North Strategic Industrial area Biological Desktop Review" (ENV 2012b)
- a targeted Level 2 fauna survey to determine the presence of any of the significant fauna species that are predicted by ENV (2012c) or RPS (2014b) as likely to occur.

If any conservation significant fauna are identified through these surveys, a Terrestrial Fauna Management Plan shall be prepared to the satisfaction of the WAPC (on advice from the DPaW).

Terrestrial Weed Management Plan

The objective of a Terrestrial Weed Management Plan is to address issues around management of fragmentation and edge effects, and annual reporting on success of the control program.



The plan is to be submitted to the WAPC for approval (on advice from the DPaW) in accordance with the Improvement Scheme. The Weed Management Plan will address the following:

- a) Objectives, targets and associated monitoring for weeds.
- b) Pre-clearing searches for weed(s) species.
- c) Management actions including addressing the risk of introducing weeds.
- d) Monitoring, contingencies and reporting.

Marine Turtle Baseline Lighting Study and Design Guidelines (if required)

The objective of the Marine Turtle Baseline Lighting Study is to inform the expected cumulative lighting impacts from future industrial development, within the Strategic Industry Zone, upon marine turtles nesting on the Ashburton River Delta Beach.

Applications for planning approval within the Strategic Industry zone are required to be supported by a Marine Turtle Baseline Lighting Study if it is likely that a significant impact will occur on the marine turtles. The study will be undertaken in accordance with EPA Environmental Assessment Guidance No. 5: Protecting Marine Turtles from Light Impacts (EPA 2010).

Should the Marine Turtle Baseline Lighting Study predict potential significant impacts from lighting on marine turtles from development, then the preparation and implementation of Design Guidelines for reducing light emissions will be required.

Mosquito Management Plan

The objective of the Mosquito Management Plan will be to adequately identify mosquito nuisance, public health risks and determine necessary management strategies.

Applications for planning approval within the Strategic Industry zone are required to be supported by a Mosquito Management Plan as required by the Improvement Scheme.

Applications for subdivision within the General Industry zone will attract the requirement for a Mosquito Management Plan as a condition of subdivision.

The plan is to be submitted to the WAPC for approval (on advice from the Department of Health and DER) in accordance with the Improvement Scheme.

Water Management Plan

The objective of the Water Management Plan is to minimise potential impacts on natural ecosystems relying on pre-development hydrological regimes and prevent unacceptable flooding.



Applications for planning approval within the Strategic Industrial zone are required to be supported by a Water Management Plan.

Applications for subdivision within the General Industry zone will attract the requirement for a Water Management Plan as a condition of subdivision.

The plan is to be submitted to the WAPC for approval (on advice from the DoW) in accordance with the Improvement Scheme.

Acid Sulfate Soil and Dewatering Management Plan (if required)

The objectives of an Acid Sulfate Soil Management Plan will be to adequately identify "actual" and "potential" acid sulfate soils and determine appropriate management strategies and construction practices to be followed to ensure effective handling, treatment and disposal of acid sulfate soils and produced water.

Applications for planning approval within the Strategic Industry zone are required to be supported by an Acid Sulfate Soil and Dewatering Management Plan if the proposal involves disturbance of land at a high risk of Acid Sulfate Soils.

The plan is to be submitted to the WAPC for approval (on advice from the DER) in accordance with the Improvement Scheme.

Fire Management Plan

Proponents within the Strategic Industry zone will require a Fire Management Plan in association with applications for planning approval. The strategies/plans are to be prepared to the satisfaction of the WAPC having regard for advice from the Department of Fire and Emergency Services and Shire of Ashburton. In this regard, proponents will reference the bush fire protection guidelines jointly prepared by the WAPC, Department of Planning and the Fire and Emergency Services Authority.

The plan will address:

- a) Objectives, targets and associated monitoring.
- b) Roles and responsibilities of personnel.
- c) Risk assessment of proposed activities and associated siting and design responses that minimise exposure to hazards.
- d) Emergency service access to potential fire sources.
- e) Fire response equipment that will be available.
- f) Fire risk reduction and management measures.



The plan is to be submitted to the WAPC for approval (on advice from the Department of Fire and Emergency Services) in accordance with the Improvement Scheme.

Applications for subdivision within the General Industry zone will attract the requirement for a Fire Management Plan as a condition of subdivision.

Noise and Air Quality Management Plan

The objective of a Noise and Air Quality Management Plan will be prepared to detail the relevant air quality and noise and vibration impact assessment criteria, best practice management and compliance checking procedures for subsequent reporting. Where a proposal is deemed a "prescribed premises" under the EP Act, the Noise and Air Quality Management Plan will reference the DER licensing and works approval requirements.

The management plan is expected to address:

- a) Identify the sources of air quality, noise and vibration emissions as a result of implementing the industrial development proposal.
- b) Qualify the air quality, noise and vibration emissions from the industrial development proposal.
- c) Identify potential sensitive receptors to air quality, noise and vibration emissions.
- d) Provide objective, targets and associated monitoring for the project.

Applications for planning approval within the Strategic Industry zone are required to be supported by a Noise and Air Quality Management Plan, addressing matters relevant to the nature of the particular proposal, as required by the Improvement Scheme.

Applications for planning approval within the Industry area that have significant offsite emissions may require, at the discretion of the WAPC, a Noise and Air Quality Management Plan addressing EPA Guidance Statement No. 3 – Separation Distances between Industrial and Sensitive Land Uses.

The plan is to be submitted to the WAPC for approval (on advice from the EPA and the DER) in accordance with the Improvement Scheme.



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5.0 ANSIA ENVIRONMENTAL CONTEXT

5.1 Onslow Climate

Onslow is located within the hot, semi-arid climatic zone. Summers (December to March) are very hot with an average maximum temperature of 36.2 °C and daily maximum of up to 36.5 °C in January, the hottest month. Winter (June to August) temperatures range from an average monthly minimum of 13.6 °C to an average monthly maximum of 26.1 °C (Bureau of Meteorology 2014a).

Most of the annual rainfall occurs from January to March from scattered thunderstorms and the occasional tropical cyclone. A secondary peak in the rainfall occurs in May and June because of rainfall events caused by tropical cloud bands that intermittently affect the area. These events can also produce low maximum temperatures particularly away from the coast. Thunderstorms average 20 to 30 events per annum in the Pilbara; however, 15 to 20 events per annum are more common near the coast (Bureau of Meteorology 2013a). Thunderstorms can result in erratic and localised rainfall events that lead to tidal surges and localised flooding of Onslow's low coastal plain area (Bureau of Meteorology 2014a).

The winds at Onslow vary in direction and strength with seasonal conditions. Generally, the windiest conditions are experienced in summer with winds generally prevailing from a south-west direction. Southerly winds are dominant in the morning, shifting to westerly in the afternoon, with an accompanying increase in speed (Bureau of Meteorology 2014a). In winter, south-easterly winds are dominant in the mornings and shift to north-westerlies in the afternoon before easing in the evening in response to diurnal land temperature changes (Bureau of Meteorology 2014a).

5.1.1 Cyclones

The coastline from Port Hedland to the Exmouth Gulf is the most cyclone prone area in Australia. Onslow has been severely impacted by eight cyclones since 1910 (Bureau of Meteorology 2014b). Cyclones are most common in the Pilbara between February and March and sometimes result in extreme rainfall events (Bureau of Meteorology 2014b).

Cyclones can cause significant increases in the ocean level through the combined effects of low atmospheric pressure, strong onshore winds and large waves breaking near shore. This increase in the water level (storm surge) has implications for coastal development.



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6.0 LAND-THEMED FACTORS

6.1 Landforms

6.1.1 Topography

The topography of the ANSIA investigation area consists of undulating, north to south orientated dune systems, alluvial/colluvial plains and low-lying coastal dune systems. Figure 6 shows that dune heights ranging from maximum heights of approximately 20 metres Australian Height Datum (m AHD) in the south-east of investigation area to approximately 10 m AHD as proximity to the coast increases. The investigation area is generally low in relief (less the 5 m AHD) and associated with areas of salt flats, clay pans and tidal creeks.

6.1.2 Land Systems

Land system mapping of the rangelands by the Department of Agriculture and Food, Western Australia and Department of Land and Surveys defines a map unit or land system as "an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation". The area was mapped at a scale of 1: 250, 000 and Payne et al. (1988) identified the following broad land systems that coincide within the ANSIA investigation area (Figure 7):

- dune: dune fields supporting soft spinifex grassland
- littoral: bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches
- Onslow: Undulating sandplains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands
- Minderoo: Alluvial plains supporting tall shrublands and tussock grasslands and sandy plains supporting hummock grasslands
- Giralia: Linear dunes and broad sandy plains supporting hard and sift spinifex.



6.2 Terrestrial Environmental Quality

6.2.1 Regional Geology

The ANSIA investigation area is underlain by the Western Region soil-landscape region, which covers slightly less than half of the state (approximately 48%) and extends from the Indian Ocean to the edge of the Sandy Desert and Central Plains regions (Chevron 2010). The Western Region is divided into 10 provinces with the ANSIA investigation area situated in the Exmouth province (Chevron 2010).

The Exmouth province soils generally comprise:

- sandplains and dunes dominated by deep red sands and deep sandy duplexes
- red-brown non-cracking clays, hard cracking clays and deep red sandy duplexes and the alluvial plains and flood plains, along with some loamy earths
- tidal soils on the coastal flats
- coastal dunes of calcareous deep sands and deep red sands
- calcareous shallow loams, red earths and stony soils on the Cape Range and other limestone hills
- red deep sands on the undulating sandy plains to the south.

6.2.2 Geology

The geological associations that underlie the project study area are coastal dune associations and beach deposits, inclusive of shelly sand containing cockles and backshore deposits (Figure 8).

6.2.2.1 Acid Sulfate Soils

The WAPC in consultation with the Department of Environment Regulation (DER) has compiled Acid Sulfate Soil (ASS) risk maps that are based on surface geology mapping, and provide a broad scale indication of the risk of occurrence of ASS.

Figure 9 shows the soils underlying the ANSIA investigation area mapped as either "High to Moderate" and "Moderate to Low" risk of ASS occurring within 3 metres of the natural soil surface.



6.3 Flora and Vegetation

6.3.1 Interim Biogeographical Regionalisation of Australia Region

The ANSIA investigation area lies within the Interim Biogeographical Regionalisation of Australia region of Carnarvon and within the coastal subregion of Cape Range (Thackway and Cresswell 1995).

The Cape Range subregion is described as:

Cape Range and Giralia dune fields form the northern part of Carnarvon Basin. Rugged tertiary limestone and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats. Acacia shrublands over Triodia on limestone (Acacia stuartii or A. bivenosa) and red dune fields, Triodia hummock grasslands with sparse Eucalyptus trees and shrubs on the Cape Range. Extensive hummock grasslands (Triodia) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves. Beach dunes with Spinifex communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based.

Kendrick and Mau 2002

6.3.2 Pilbara Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara region at a scale of 1:1,000,000. Vegetation types, as described by Beard (1975), within the ANSIA investigation area are (Figure 10):

- hummock grasslands, grass steppe; soft spinifex (117)
- steppe (124)
- bare area mudflats (127)
- mosaic: short bunch grassland savannah/grass plain (Pilbara)/hummock grasslands, grass steppe; soft spinifex soft spinifex (589)
- hummock grasslands, shrub steppe; scattered shrubs over Triodia basedowii (670).

Shepherd et al. (2002) updated the Beard (1975) vegetation boundaries to account for clearing in the intensive land use zone, and divided some larger vegetation units into smaller units. Table 8 shows pre-European extent of these vegetation associations remaining and their priority for conservation.



Table 8: Reservation Status and Priority of Beard Vegetation Associations Represented within the ANSIA Investigation Area

Assoc. No.	Percentage of Pre- European Extent Remaining	IUCN Class I–IV Reserves	Non-IUCN Reserves	DPAW- Purchased Lease	Reservation Priority
117	100%	13.3	1.0	0.0	Medium
124	No Information available	No Information available	No Information available	No Information available	No Information available
127	100%	7.0	4.0	0.0	High
589	100%	1.6	0.0	0.0	High
670	100%	0.0	0.0	1.9	Low

(Sources: Shepherd, Beetson and Hopkins 2002; Kendrick and Mau 2002

Shepherd et al. (2002) identifies that 100% of the pre-European extent of hummock grasslands, grass steppe; soft spinifex (117) vegetation type remains. Kendrick and Stanley (2001) identify that Beard vegetation type Hummock grasslands, grass steppe; soft Spinifex has a low priority for conservation.

6.3.3 Flora and Vegetation of the ANSIA Investigation Area

RPS has prepared a desktop *Flora and Vegetation Review* (RPS 2014a) of the ANSIA investigation area, which reviewed and synthesised the findings of eight previous detailed flora and vegetation surveys, primarily undertaken for the Wheatstone and Macedon projects, and database searches (Appendix 2). Table 9 identifies the reports reviewed by RPS (2014a) and Figures A and 3 identifies the relevant survey areas in relation to the ANSIA.

Table 9: Summary of Flora and Vegetation Surveys for the ANSIA Investigation Area

Report Name	Author	Level of Survey
A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow	Biota (2010a)	Level 2 quadrat based field survey
Desktop Review of the Proposed Onslow Micro-Siting Survey Area	Biota (2013)	Desktop survey
Flora and Vegetation Survey – Ashburton North Project	Onshore Environmental Consultants (2008)	Level 2 quadrat based field survey
Flora and Vegetation Survey – Ashburton North Project Area – Stage 2	Onshore Environmental Consultants (2009)	Level 2 quadrat based field survey
Wheatstone Project Flora and Fauna Assessment Addendum	Biota (2010b); Outback Ecology Services (2010)	Level 2 quadrat based field survey
BHPB Macedon Gas Development Flora and Vegetation Survey (Phases 1 and 2)	Astron (2009)	Level 2 quadrat based field survey
Baseline Vegetation and Flora Survey, Ashburton North Pipeline Route Option 3	RPS (2009)	Level 2 quadrat based field survey



Report Name	Author	Level of Survey
Ashburton North Strategic industrial Area Supplementary Flora and Vegetation Survey	ENV (2011)	Level 2 quadrat based field survey
Ashburton North Strategic Industrial Area Biological Desktop Review	ENV (2012)	Desktop survey
Ashburton North Strategic Industrial Area Flora and Vegetation Assessment	ENV (2012)	Level 2 quadrat based field survey

(Source: RPS 2014a and ENV 2011, 2012a, 2012b)

6.3.4 Conservation Significance of the Vegetation within the ANSIA Investigation Area

An amalgamation of survey data from Biota (2010a), Onshore Environmental Consultants (2008), Onshore Environmental Consultants (2009), Biota (2010b) and Outback Ecology Services (2010) resulted in the delineation and description of 33 vegetation sub-associations over the ANSIA investigation area (Figure 11). The vegetation of the 33 sub-associations was assessed by Biota (2010a) for conservation significance and it was ranked in order of conservation priority. Their assessment focussed on three factors:

- the land system to which the vegetation sub-association belongs and its level of representation within the region
- the capacity for the vegetation sub-association to support conservation significant flora
- the reservation priority of the ecosystems as identified by Kendrick and Mau (2002).

This assessment identified three vegetation sub-associations within the Biota (2010a; 2010b) project areas of High conservation significance, and two of Moderate conservation significance. Only four of these five sub-associations lie within the ANSIA investigation area (Table 10).

The remaining 28 sub-associations were considered by Biota (2010a; 2010b) to be of Low conservation significance as they were representative of the locality.

Table 10: Vegetation Sub-associations of Conservation Significance

Vegetation Sub-association	Description	Rank	Reason
Vegetation of Inland Sand Dune			
GsCRcTRzTe	Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Trichodesma zeylanicum var. grandiflorum open shrubland over Triodia epactia open hummock grassland	Н	Supports Priority taxa Eremophila forrestii subsp. viridis (P3) and Triumfetta echinata (P3) Susceptible to erosion and weed invasion



Vegetation Sub-association	Description	Rank	Reason	
GsCRcHBbTsTe	Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Hibiscus brachychlaenus open shrubland over Triodia shhinzii (Triodia epactia) open hummock grassland	Н	Supports Priority taxa Eremophila forrestii subsp. viridis (P3) and Triumfetta echinata (P3) Susceptible to erosion and weed invasion	
Vegetation of Clay Pans				
TEC spp	Tecticornia spp. Low shrubland	Н	Supports Priority taxon Eleocharis papillosa (P3/ Vulnerable)	
Cracking Clay Grasslands				
SPmERlbEUa	aff. Benthamii, Eriachne Atriplex flab benthamii, Eulalia aurea tussock (P3). Gener		Supports Priority taxon Atriplex flabelliformis (P3). Generally in very Good condition	

(Source: Biota 2010a)

6.3.5 Threatened and Priority Ecological Communities

Ecological communities are defined as "naturally occurring biological assemblages that occur in a particular type of habitat" (English and Blythe 1997). Threatened Ecological Communities (TECs) are ecological communities that have been assessed and assigned to one of four categories related to the status of the threat to the community, i.e. Presumed Totally Destroyed, Critically Endangered, Endangered, and Vulnerable.

Possible TECs that do not meet survey criteria are added to the DPaW Priority Ecological Community (PEC) Lists under Priorities I, 2 and 3 (PI, P2, P3). These ecological communities are adequately known; are rare but not threatened, or meet criteria for Near Threatened. PECs that have been recently removed from the threatened list are placed in Priority 4 (P4). These ecological communities require regular monitoring. Conservation Dependent ecological communities are placed in Priority 5 (P5).

There are two TECs within the Pilbara region endorsed by the Minister of the Environment (DPaW 2014a), "46. Themeda Grasslands: Themeda grasslands on cracking clays (Hamersley Station, Pilbara)" and "78. Ethel Gorge: Ethel Gorge aquifer stygobiont community". Neither of these communities occurs in the vicinity of Onslow or is likely to occur within the ANSIA investigation area.

Additionally, there are 30 PECs listed for the Pilbara region (DPaW 2014b), however none of these correlate to any of the 33 vegetation sub-associations mapped and described for the ANSIA investigation area to date (Biota 2010a).



6.3.6 Conservation Significant Flora

One taxon, *Eleocharis papillosa*, listed federally as Vulnerable under the EPBC Act, was recorded from the ANSIA investigation area by (Biota 2010a). No other species listed under the EPBC Act have been previously recorded from the site, the locality, or are expected to occur in the habitats within the ANSIA investigation area.

Four conservation significant flora species were collectively recorded from the Biota and ENV surveys undertaken for the ANSIA investigation area, *Eleocharis papillosa* (P3), *Eremophila forrestii* subsp. *viridis* (P3), *Triumfetta echinata* (P3) and *Atriplex flabelliformis* (P3). These species were associated with particular vegetation associations and landforms (Table 11).

Figure 12 shows Priority Flora records coinciding with the crests and ridges of inland sand dunes.

Table II: Priority Species and Associated Vegetation and Landform

Priority Taxon Vegetation Sub-association		Landform	
Eleocharis papillosa (P3)	Samphire shrublands vegetation subassociation <i>TEC</i> spp.	Dune crest	
Eremophila forrestii subsp. viridis (P3)	Inland sand dune vegetation sub- association GsCRcTRzTe	Dune crest	
Triumfetta echinata (P3)	Inland sand dune vegetation sub- association GsCRcHBbTsTe	Dune crest	
Atriplex flabelliformis (P3)	Clay pan vegetation sub-association TECspp and Clayey Plain vegetation sub-association SPmERLbEUa	Clay pan and plains	

6.4 Terrestrial Fauna

6.4.1 Terrestrial Fauna of the ANSIA Investigation Area

RPS has prepared a desktop *Terrestrial Fauna Review* (RPS 2014b) of the ANSIA investigation area that reviewed and synthesised the findings of nine previous detailed flora and vegetation surveys, primarily undertaken for the Wheatstone and Macedon projects, and database searches (Appendix 3). The following reports were reviewed by RPS (2014a) with Figure 3 identifying the relevant survey areas in relation to the ANSIA:

- Wheatstone Project Terrestrial Fauna Survey (Biota 2010c)
- Wheatstone Project Flora and Fauna Assessment Addendum (Biota 2010d)
- Wheatstone Project Claypan Ephemeral Fauna Survey (Biota 2010e)



- Wheatstone Project Subterranean Fauna Assessment (Biota 2010f)
- Survey for Migratory Waterbirds in the Wheatstone LNG Project Area, November 2008 and March 2009 (Bamford 2009a)
- Fauna Assessment BHP Billiton Petroleum Pty Ltd Macedon Gas Development Terrestrial Plant Site and Linear Infrastructure Corridor (Bamford 2009b)
- Ashburton North Strategic Industrial Area Biological Desktop Review (ENV 2012b)
- Ashburton North Strategic Industrial Area Fauna Assessment (ENV 2012c)
- Desktop Review of the Proposed Onslow Micro-Siting Survey Area (Biota 2013)
- Marine Turtle Beach Survey, Onslow Mainland Areas and Nearby Islands, 25
 January–6 February 2009 (Pendoley Environmental 2009).

6.4.2 Habitat Types

Biota (2010a; 2010b; 2013) and ENV (2012c) identified the following broad fauna habitats occur within the Wheatstone project area, addendum area and micro-siting area which accord with the ANSIA:

- Primary Dune: Spinifex and Triodia grassland and buffel tussock on primary dune
- Inland Dune: Triodia epatica dominated hummock grassland on inland dunes system
- Sand/Loam Plain: Acacia sp. over Triodia epatica hummock grassland on sand / loam plain
- Buffel on Clay: Acacia sp. over buffel tussock grassland on clay plain
- Samphire: Samphire Clay Plan
- Tussock on Clay: Tussock grassland on clay plain
- Drainage: Eucalyptus sp. and buffel tussock on dominated drainage lines.

Biota (2010d; 2013) noted that no new or substantially different habitats were identified in the Wheatstone addendum area or micro-siting area when compared to the Wheatstone project area. Informed by the findings of additional fauna surveys undertaken by Bamford (Bamford 2009a; Bamford 2009b) and Biota (Biota 2010e; 2010f) it is considered that the fauna habitat assessments over the various project areas are applicable to the unsurveyed portions of the ANSIA.



6.4.3 Conservation Significant Fauna

The Level 2 fauna survey undertaken by Biota (2010c) identified combined total of 128 vertebrate species, comprising 51 herpetofauna species, 60 avifauna species and 17 mammals. Due to the proximity of the Wheatstone addendum area (Biota 2010d) and the micro-siting area (Biota 2013) and that these areas contained the same habitat types, the assemblage of vertebrate fauna identified by Biota (2010e) was considered to be representative of these areas. The site inspection and targeted survey undertaken by Bamford (2009b) recorded nine reptile species, 52 avifauna species and two mammals.

Conservation significant fauna are those species protected under the WC Act and / or the EPBC Act and those listed as priority species by DPaW. Note a species may be listed under multiple conservation categories (e.g. a species may be listed as threatened and migratory).

A summary of conservation significant fauna identified by the database searches is provided in Table 12. A complete list of conservation significant fauna species potentially occurring near the ANSIA is provided in Appendix 4.

Table 12: Fauna Identified by Database Searches as Potentially Occurring near the ANSIA

Taxon	Threatened Species* [†]	Migratory Species [†]	Specially Protected Species*	Priority Species
Reptiles	2	0		1
Bird	10	31	1	4
Mammals	2			3
Total	14	31	1	8

^{*}Protected under the WC Act †Protected under the EPBC Act

The following sections review the conservation significant fauna species identified as potentially occurring near the ANSIA and provides an assessment of the likelihood of significant impacts occurring to these species because of developing the site for industrial purposes. Due to similar habitat requirements and the detail of previous surveys undertaken for migratory birds relating to the ANSIA and, more generally to the Onslow region, for the purpose of this review migratory birds have been treated as an assemblage of species rather than specific individuals. Additionally, where species have been identified in Appendix 4 but are not expected to occur near the ANSIA, such as the keeled slider or the western barred bandicoot, these species have not been assessed by this review.



6.4.4 Threatened Species

6.4.4.1 Reptiles

Two species of threatened reptiles were identified as potentially occurring near the ANSIA (Appendix 4).

Airlie Island Skink

The Airlie Island skink is known from approximately 12 locations in north-west Western Australia, Airlie Island (offshore from Onslow), Thangoo Station (Roebuck Bay), Pretty Pool and Wedgefield (Port Hedland), Redbank (Port Hedland), Finucane Island (Port Hedland), Beebingarra Creek, Roebuck (Crab Creek), Cape Keraudren (Pardoo), Port Smith (Lagrange), Willie Creek (Broome), Boodarie Station and Karratha. On the mainland, the Airlie Island skink is known to inhabit the landward fringe of salt marsh communities in samphire shrubland or marine couch grassland in the intertidal zone along mangrove margins. This species is strongly associated with samphire species, Tectornia halocnemoides subsp. tenuis and Suaeda arbusculoides, which occur on clayey soils, and mixed herb and grass cover of Muellerolimon salicorniaceum and Sporobolus virginicus, which occur on sandy soils (DotE 2014a).

Given the known locations of the Airlie Island skink and that it was not detected by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010a; Bamford 2009b) it is considered likely that this species is locally absent from the site.

Pilbara Olive Python

The Pilbara olive python is common and wide-spread in the Pilbara and has been identified as a species that should not be listed as threatened or declining (Kendrick and Stanley 2001). Pilbara olive pythons are most often seen at night and are generally found around rocky areas, rocky outcrops and cliffs, particularly in the vicinity of watercourses and water holes, but are also known to shelter in logs, flood debris, caves, tree hollows and thick vegetation (Burbidge 2004).

The DPaW search results identify that the Pilbara olive python has been recorded in the vicinity of the Wheatstone project area once in 2012. This species was not detected by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010c; Bamford 2009b). Given the large area of suitable habitat available for this species surrounding the ANSIA, and the isolated nature of development proposed within the site, the risk of significant impact occurring to the Pilbara olive python resulting from the development of the site for industrial purposes is considered low.



6.4.4.2 Birds

Nine species of threatened birds were identified as potentially occurring near the ANSIA (Appendix 4).

Red Knot (North-eastern Siberia)

This red knot breeds in north-east Siberia, including the Chukotskiy Peninsula, possibly areas farther west, and winters in Australia. The red knot is common in all the main suitable habitats around the coast of Australia, but is less numerous in south-west Australia than elsewhere. Very large numbers are regularly recorded in north-west Australia, with 80 Mile Beach and Roebuck Bay being particular strongholds. Red knots mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and salt works, but rarely use freshwater or inland lakes or swamps (DotE 2014c).

This species has been recorded once by the DPaW search results at the Ashburton River mouth in 1980. This species was not recorded by surveys undertaken by either Biota (2010c) or Bamford (2009a; 2009b) and it is therefore considered unlikely to be significantly impacted because of developing the ANSIA for industrial purposes.

Curlew Sandpiper

The curlew sandpiper breeds in north Siberia and winters from western Africa to Australia. In Australia, curlew sandpipers occur around the coasts and are quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps, lakes and lagoons near the coast, and ponds in salt works and sewage farms (DotE 2014d).

This species has been recorded by twice by the DPaW search results in the vicinity of Onslow in 1999 and it was detected at Onslow by Bamford (2009a). The curlew sandpiper not recorded within either the Wheatstone or the Macedon project areas by either Biota (2010c) or Bamford (2009a; 2009b). Given that this species has not been recorded within the ANSIA and the large area of suitable habitat available for this species in the Pilbara the risk of significant impact occurring to the curlew sandpiper because of developing the site for industrial purposes is considered low.



Great knot

The great knot breeds in north-east Siberia and winters along coastal areas. It feeds on bivalves, gastropods, crustaceans and other invertebrates it finds in shallow coastal waters (DotE 2014e).

Bamford (2009a) recorded this species along the Onslow coast and the Ashburton River in low numbers (maximum count of five individuals). This species has also previously been recorded in low numbers (nine individuals) at Dampier salt works, which are east of the ANSIA by Bamford. Although this species is known to occur in coastal and riverine habitats in low numbers the vicinity of the site, it is considered unlikely to occur within the terrestrial habitats of the ANSIA due to a lack of habitat. The risk of significant impact occurring to the great knot as a result of developing the site for industrial purposes is considered to be low.

Greater Sand Plover (Mongolian)

This greater sand plover breeds in the northern parts of the Gobi Desert in Mongolia and in north-western China, and winters in Australasia and South-east Asia. In Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. Greater sand plovers mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons and seldom occur at shallow freshwater wetlands (DotE 2014f).

This sub-species has been recorded once in the DPaW search results in Onslow in 1900. This sub-species was not recorded within either the Wheatstone or the Macedon project areas by either Biota (2010c) or Bamford (2009a; 2009b). Common greater sand plovers (*Charadrius leschenaultii*) were recorded in low numbers adjacent to the site along the coastline and riverine areas (with a maximum count of 23 individuals at Town Beach in Onslow). It is considered that greater sand plover (Mongolian) is unlikely to occur within the terrestrial habitats of the ANSIA, therefore the risk of significant impact occurring to this subspecies because of developing the site is considered low.

Lesser Sand Plover

The lesser sand plover breeds in Mongolia and Russia and it winters from Taiwan to Australasia. In Australia, this species is widespread in coastal regions, and has been recorded in all states. The lesser sand plover mainly occurs in northern and eastern Australia, in south-eastern parts of the Gulf of Carpentaria, western Cape York Peninsula and islands in Torres Strait, and along the entire east coast, though it occasionally also occurs inland. This species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sand flats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wavecut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves (DotE 2014g).



This species was recorded at Town Beach in Onslow by Biota (2010c) and Bamford (2009a) with maximum count of six individuals and has not been recorded elsewhere along the coastline. Given that the lesser sand plover has only been recorded in the coastal environment at Town Beach, it is considered unlikely to occur within the terrestrial habitats of the ANSIA. Therefore the risk of significant impact occurring to the lesser sand plover as a result of developing the site for industrial purposes is considered to be low.

Bar-tailed Godwit

The bar-tailed godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, New South Wales and Victoria, including the offshore islands. The bar-tailed godwit is found mainly in coastal habitats such as large intertidal sand flats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays (DotE 2014h).

This species was recorded adjacent to the site along the coastline in low numbers (maximum individual count of 29 at the Dampier salt works) by Bamford (2009a). Given the bar-tailed godwits preference for coastal habitats it is considered unlikely to occur within the terrestrial habitats of the ANSIA, therefore the risk of significant impact occurring to the bar-tailed godwit because of developing the site for industrial purposes is considered low.

Southern Giant Petrel

The southern giant petrel is a marine bird that occurs in Antarctic through to subtropical waters. This species is widespread throughout the Southern Ocean and known to breed on six sub-Antarctic and Antarctic islands (DotE 2014i). It is considered unlikely that this oceanic species would be recorded in the ANSIA; therefore, the risk of affecting the southern giant petrel is considered low.

Eastern Curlew

The eastern curlew breeds in Siberia, Kamchatka and Mongolia, and winters in coastal areas of east Asia and Australia. Within Australia, the eastern curlew primarily has a coastal distribution and is rarely recorded inland. The species is found in all states, particularly the north, east, and south-east regions, including Tasmania, and have a continuous distribution from Barrow Island and Dampier Archipelago, Western Australia, through the Kimberley Division and along Northern Territory, Queensland, and New South Wales coasts and the islands of Torres Strait. The eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among salt marsh and on mudflats fringed by mangroves, and sometimes they use the mangroves. The birds are also found in salt works and sewage farms (DotE 2014j).



This species was recorded along the coastline adjacent to the site, with a maximum count of 10 at Beadon Creek in Onslow by Bamford (2009a). Given the eastern curlew's preference for estuarine habitats, it is considered unlikely to occur within the terrestrial habitats of the ANSIA; therefore, the risk of significant impact occurring to this species because of developing the site for industrial purposes is considered low.

Night Parrot

The distribution of the night parrot is very poorly understood with a small number of confirmed and well-regarded records from arid and semi-arid regions of Queensland, South Australia, Western Australia and the Northern Territory. The night parrot inhabits arid and semi-arid areas that are characterised by having dense, low vegetation consisting of *Triodia* grasslands in stony or sandy environments, and of samphire and chenopod shrublands, including genera such as *Atriplex*, *Bassia* and *Maireana*, on flood plains and clay pans, and on the margins of salt lakes, creeks or other sources of water (DotE 2014k).

In the vicinity of the ANSIA, the night parrot is known from one recording from the DPaW search results made in 1967 near Mount Stuart, which is a significant distance outside of the site. Given the isolated nature and age of the DPaW recording and that this species was not recorded by fauna surveys undertaken for either the Wheatstone or the Macedon project areas (Biota 2010c; Bamford 2009b) it is considered that this species is most likely absent from the ANSIA.

Fairy Tern

Within Australia, the fairy tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia, occurring as far north as the Dampier Archipelago near Karratha. This species nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation and has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (DotE 2014).

This species was not recorded by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010c; Bamford 2009a; 2009b). Given the fairy tern's preference for coastal habitats, it is considered unlikely to occur within the terrestrial habitats of the ANSIA; therefore, the risk of significant impact occurring to this species because of developing the site for industrial purposes is considered low.

6.4.4.3 Mammals

The northern quoll was the only threatened mammal species identified as potentially occurring near the ANSIA (Appendix 4).



Northern Quoll

The northern quoll is found in eastern and northern Queensland, northern parts of the Northern Territory, the Kimberley and the Pilbara. Islands off the Western Australian coast that support northern quolls include Adolphus, Augustus, Bigge, Boongaree, Dolphin, Hidden, Koolan and Wollaston (DotE 2014m).

In the Pilbara, the Great Sandy Desert, Gibson Desert and Little Sandy Desert define the distributional boundaries of northern quoll in the north, east and south. Records from the Pilbara bioregion are scattered across the four subregions; namely the Hamersley, Fortescue Plains, Chichester and Roebourne plains subregions with records extending as far west as the Little Sandy Desert and as far south as Karinjini National Park (DotE 2014m).

The majority of recent Pilbara records have come from the Rocklea, Macroy and Robe land systems. These land systems do not occur within the ANSIA and comprise of basalt hills, mesas, high and low plateaux, lower slopes, occasional tor fields and stony plains supporting either hard or soft spinifex grasslands. The northern quoll has also been recorded in other land systems, which comprise sandstone and dolomite hills and ridges, shrublands, sandy plains, clay plans and tussock grasslands and coastal fringes including dunes islands and beaches (DotE 2014m).

The land systems preferred by the northern quoll are not present within the ANSIA and northern quolls were not recorded by fauna surveys undertaken for either the Wheatstone or the Macedon project areas (Biota 2010c; Bamford 2009b). Bamford (2009b) identifies the low rocky hills in the south-east of the Macedon project area did not contain small caves and crevices that this species favours, however noted that the lower reaches of the Ashburton River may provide suitable habitat for the northern quoll.

The DPaW search results identify that three northern quolls have been recorded near the Wheatstone project area between 2012 and 2013 indicating that there is likely to be at least some habitat for this species near the ANSIA. Habitat critical to the survival of this species (Commonwealth of Australia 2011) includes:

- rocky habitats such as ranges, escarpments, mesas, ranges, gorges, breakaways, boulder fields, major drainage line or treed creek lines
- structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs
- offshore islands where the northern quoll is known to exist.



No habitat critical to the survival of the northern quoll has been identified or is expected to occur within the ANSIA. Informed by the findings of Bamford (2009b), and critical habitat requirements of this species, the lower reaches of the Ashburton River approximately 2 km west of the site may provide suitable habitat for a low-density population of northern quoll.

Given the large area of similar habitat available for this species surrounding the ANSIA, and the isolated nature of development proposed within the site, it is considered unlikely that the northern quoll would be significantly impacted by the development of the ANSIA for industrial purposes.

6.4.5 Migratory Bird Species

Bamford (2009a) undertook two surveys for Migratory Waterbirds in the Wheatstone project area, November 2008 and March 2009. Bamford (2009a) found that key water bird habitats were Town Beach (in Onslow), near-coastal tidal flats near the Turbridgi Gas Plant, near coastal flats between the Wheatstone project area and the Onslow salt ponds and on the inland freshwater marshes (Figure 13). Migratory waterbird numbers were found by Bamford (2009a) to be generally low in a regional context, with exceptions being non-conservation significant duck, heron and ibis species on the inland freshwater marshes in March.

Bamford (2009a) observed that the greatest concentration of migratory waterbirds was on the coastal flats between the Wheatstone project area and the Onslow salt ponds. Bamford (2009a) noted that these birds were probably roosting and/or foraging close to or within the Wheatstone project area and concluded that any potential impacts on this area is unlikely to be significant as these near coastal clay pan and tidal habitats are extensive in the Onslow.

The key finding of Bamford (2009a) was that the Wheatstone project area and surrounding areas do not support important numbers of migratory waterbirds with potential impacts upon migratory waterbirds likely to be low.

Within the ANSIA, the littoral land system is associated with migratory waterbird habitat and was included in the Bamford (2009a) survey area (Figure 13). Informed by Bamford's findings it is considered that the terrestrial habitats within the site are of limited habitat value and are unlikely to support significant numbers of migratory waterbirds. It is considered that the risk of significant impact occurring to migratory waterbird species because of developing the ANSIA for industrial purposes is low.



6.4.6 Other Specially Protected Fauna

6.4.6.1 Peregrine Falcon

The peregrine falcon is widely distributed throughout Australian habitats inclusive of woodlands, wetlands and open country, although they are generally absent from treeless and waterless deserts and dense forests. Peregrine falcons prefer cliff faces as nest sites (Birds Australia 2012).

The DPaW search results identify that this species has been recorded twice recently near the ANSIA (Appendix 3). Bamford (2009a) noted that no cliff faces were observed in the vicinity of the Wheatstone project area. Given the relative homogeneity of the topography of the ANSIA (Figure 6) when compared to the Wheatstone project area it is considered unlikely that any cliff faces are located within the site therefore it is unlikely that the peregrine falcon would be significantly impacted.

6.4.7 Priority Species

Priority species have been recorded within or in the vicinity of the Wheatstone and Macedon project areas Biota (2010c) and Bamford (2009b) are:

- little northern freetail-bat (Priority 1)
- western pebble-mound mouse (Priority 4)
- short-tailed mouse (Priority 4)
- bush stone-curlew (Priority 4)
- Australian bustard (Priority 4)
- star finch (western) (Priority 4)
- flock bronzewing (Priority 4).

Figure 14 shows the location where these species where recorded and the number of individuals recorded by Biota (2010c) within the ANSIA.

It is considered that a small proportion of local habitat suitable for these taxa would be cleared relative to their wider distribution in Onslow and the wider region, therefore the risk of significant impact occurring to these priority species as a result of developing the site for industrial purposes is considered to be low.

6.4.8 Clay Pan Ephemeral Fauna

Biota (2010e) assessed the ephemeral fauna of the clay pans present within the Wheatstone project area and found that the assemblage of fauna species in the clay pans was similar to those represented in the reference sites located in the vicinity of the project area. ENV (2012b) noted that the zooplankton and macro-invertebrate taxa recorded in the Wheatstone project area were considered to be widespread in Onslow. Biota (2010e) concluded that it is unlikely that any significant clay pan fauna diversity values would be compromised by the implementation of the Wheatstone project.



Given the homogeneity of fauna habitats near the ANSIA, it is considered that it is unlikely that any significant clay pan fauna diversity values would be compromised by the development of the site for industrial purposes.

6.4.9 Subterranean Fauna

Biota (2010f) assessed the subterranean fauna occurring in the Wheatstone project area and surrounds Biota (2010f) sampled a total of 18 bore holes for troglofauna and stygofauna over three sampling phases. A total of 14,398 invertebrate specimens representing eight orders were recorded, none of these species were troglomorphic (Biota 2010d). The two stygal taxa were collected from three bore holes during this study were considered by Biota (2010f) not to be restricted to the Wheatstone study area.

Given the homogeneity of fauna habitats near the ANSIA, it is considered that it is unlikely that any significant troglofauna or stygofauna diversity values would be compromised by the development of the site for industrial purposes.



7.0 SEA-THEMED FACTORS

7.1 Marine Turtles

The DPaW search results identify that green turtles (*Chelonia mydas*) and flatback turtles (*Natator depressus*) are known to utilise the Ashburton River Delta Beach, approximately 4.5 km west of the ANSIA, for nesting (Figure 3).

For the Wheatstone project, Pendoley (2009) undertook a three day line census and snap shot survey of the coastline between Urala Beach and Onslow Back Beach in February which recorded one newly laid and one emerged flatback turtle nest; and evidence of 18 nests laid prior to the survey (five of which were confirmed flatback nests) at the Ashburton River Delta Beach.

Pendoley (2009) noted that the observed level of flatback nesting along mainland beaches is not regionally or even locally significant based on current knowledge of marine turtles nesting in the region. Pendoley (2009) found that hatching emergence patterns indicated very little disruption to sea-finding behaviour.

Future industrial development within the Strategic Industry Zone of the ANSIA has the potential to contribute to cumulative light impacts (skyglow), to the existing night light environment of Ashburton River Delta Beach, which may potentially disrupt turtle nesting and hatchling sea-finding behaviours. Baseline lighting studies may be required to inform the expected cumulative lighting impacts from the industrial development of the site upon marine turtles nesting on the Ashburton River Delta Beach.



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8.0 WATER-THEMED FACTORS

8.1 Hydrological Processes

8.1.1 Surface Water

The ANSIA is situated on a large river plain delta subject to highly complex hydrological flows, including freshwater flooding and breakout flows, from the Ashburton River, associated with intense rain events, and tidal and storm surge inflows from the ocean.

The Ashburton River Delta is a dynamic system that is divided between the low relief Ashburton River mouth, Southwest and Hooley Creek catchments. These catchments frequently over top during flood events meaning the Ashburton River in flood may flood levels and stream flow in both the Southwest and Hooley Creek catchments (BG&E 2012). Being a dynamic system, the locations of minor drainage channels have historically changed in response to particular events, which generally reflects the combination of the site's limited relief, mobility of the coastal landforms and surface geology (BG&E 2012).

The mapped surface water body is illustrated in Figure 15.

8.1.2 Groundwater

The ANSIA investigation area is geologically over the North Carnarvon Basin with underlying hydrogeological formations in descending order of depth being Coastal alluvial aquifers, Trealla limestone aquifer, Yarraloola conglomerate and Lyons group aquifer (BG&E 2012).

The confined Bridrong Sandstone aquifer is the predominant source of groundwater for stock and domestic water supplies in the Carnarvon Basin (BG&E 2012).

The local groundwater below the ANSIA ranges from brackish to hypersaline as the proximity to the coast increases with the distribution of Total Dissolved Solids (TDS) indicating vertical salinity stratification, with varying between 2,000 to 200,000 mg/L (BG&E 2012). Groundwater flow is anticipated to be in a northerly direction towards the ocean.

8.1.3 District Water Management Strategy

The ANSIA is subject to a number of environmental and engineering constraints, particularly in relation to flood risk mitigation and the potential impacts of earthwork and drainage design on the local environment. Subsequently, a District Water Management Strategy (DWMS) supporting the ANSIA Structure Plan (Stage I) was prepared by ENV in 2010.



The DWMS considered the management of both groundwater and surface water. In relation to groundwater management within the ANSIA, the DWMS aims to minimise any potential impacts, including cumulative impacts, to protect the long term health of waterways, aquifers, wetlands, springs, flood plains and estuaries (ENV 2010). With respect to flood protection and surface water management, the DWMS proposes to ensure adequate protection is provided to buildings and infrastructure against flooding and storm surge, maintenance of pre-development flows and minimise the release of anthropogenic pollutants (ENV 2010).

The DWMS recommended the development of a Local Water Management Strategy (LWMS) to accompany future development applications to ensure total water cycle management.

The DWMS was endorsed by the DoW as part of the ANSIA Structure Plan.

8.1.4 Local Water Management Strategy

A LWMS was prepared by ENV in 2011 in support of the Wheatstone Development Plan for Stage IA within the ANSIA.

A LWMS was prepared by BG&E in 2012 in support of the associated Development Plan for Stages IB and IC within the ANSIA.

The primary purpose of the LWMS is to ensure that the requirements, objectives and principles for total water cycle management are met during the planning process as well as the subsequent engineering and design studies for Stage IB and IC (BG&E 2012).

The LWMS modelled pre- and post-development flows (as illustrated in Figure 16) and provides local level water management strategies that will be addressed during the next stages of the planning process (BG&E 2012). It facilitates the implementation of integrated water cycle management in the final stages of planning and development of future subdivisions and directs future proponents in the detailed design and engineering (BG&E 2012).

The majority of future industrial development will be involved the development of large industrial lots. Future proponents will be responsible for preparing their own drainage designs and installing appropriate pollution control measures. Each site will be required to prepare an Urban Water Management Plan detailing these measures as well as detailing their water and wastewater servicing arrangements (BG&E 2012).



9.0 AIR THEMED FACTOR

9.1 Air Quality

Within the ANSIA investigation area, the occupants of the workforce accommodation area are considered to be potentially sensitive to dust emissions from construction activities and air emissions (gases, dust and odours) from industrial land uses. Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (EPA 2005) identifies generic separation distances, developed by the EPA, to determine appropriate buffers between sensitive and industrial land uses.

The distance of the proposed Strategic Industry zone to the workforce accommodation area is greater than 3 km. It is considered unlikely that significant dust emission impacts on the workforce accommodation area would be expected from construction activities within the Strategic Industry Zone.

EPA (2005) identifies the industrial land uses with a potential or generic separation distance for air emissions in excess of 3 km are:

- ammonium importation storage (case by case)
- electric power generation >20 megawatts (total) for natural gas fired facilities and
 >10 megawatts (total) for facilities using other fuels (between 3 km to 5 km separation)
- gold roaster (5 km separation)
- mineral sands synthetic rutile plant (between 3 km to 5 km separation).

Should these land uses be considered within the Strategic Industry Zone, within 3 to 5 km of the workforce accommodation area, a site specific assessment may need to be undertaken to determine an appropriate separation distance for the specific industrial land use.

Apart from the above land uses, it is considered unlikely that significant air quality impacts on either the workforce accommodation area would be expected from industrial land uses within the Strategic Industry Zone.

9.1.1 Dust Emissions

The western site within the General Industry Zone is located approximately 1 km from the workforce accommodation area (Figure 4).



It is considered likely that construction activities undertaken in these areas, coupled with a significant increase in vehicle movements in the area, would result in elevated dust levels in the vicinity of the workforce accommodation area during the development phase. The Construction Environmental Management Plan should consider dust management and aim to minimise offsite dust impact from construction activities.

9.1.2 Air Emissions

9.1.2.1 General Industry Zone

Industrial land uses proposed to be implemented within the General Industry zone that may have a significant impact on air quality should be subject to site-specific assessment to determine an appropriate separation distance from the workforce accommodation area.

9.1.2.2 Power Station

The separation distance for air emissions from electric power generation facilities identified in Guidance Statement No. 3: Separation Distances between Industrial and Sensitive Land Uses (EPA 2005) is:

- between 3 km to 5 km for facilities larger than 20 megawatts (total) for natural gas fired generators and 10 megawatts (total) for generators using other fuels
- between 2 km to 3 km for facilities using natural gas fired generators smaller than
 20 megawatts (total) and larger than 10 megawatts (total).

Horizon's power stat 18-megawatt (total) power station is proposed to be located greater than 3 km to the east of the workforce accommodation area. The power station will use a combination of five 2-megawatt (10 megawatts) natural gas fired generators smaller and four 2-megawatt (eight megawatts) diesel fuelled generators (Horizon Power 2014).

Figure 4 shows a conservative 3 km buffer has been applied from the boundary of the land holding, where the power station is proposed to be located, does not intersect the workforce accommodation area. Figure 4 demonstrates that a power station using 10-megawatt natural gas fired generators and eight-megawatt diesel fuelled generators is unlikely to influence air quality significantly in the vicinity of the workforce accommodation area.



10.0 PEOPLE-THEMED FACTORS

10.1 Amenity

The workforce accommodation area is located 3 km from the key industrial noise source of the proposed power station (Figure 4). The workforce accommodation area provides short-stay accommodation for resource industry workers, and any proposed noise generating facilities (including a power station), within the vicinity of the workforce accommodation area will need to demonstrate that the amenity of the occupants will not be compromised from either the construction or operation of a facility.

10.1.1 Noise

10.1.1.1 Industry Zone

Industrial land uses proposed to be implemented within the Industry Zone that may have a significant noise impact should be subject to site specific assessment to determine an appropriate separation distance from the workforce accommodation area.

10.1.1.2 Power Station

The separation distance for noise from electric power generation facilities is the same as for air emissions (Section 9.1.2.2). Figure 4, the proposed external and internal buffer, demonstrates that a power station using 10-megawatt natural gas fired generators and eight-megawatt diesel fuelled generators is unlikely to influence noise levels significantly in the vicinity of the workforce accommodation area.

10.2 Aboriginal Heritage

A search of the Department of Aboriginal Affair's (DAA) Aboriginal Heritage Inquiry System (undertaken in June 2015) indicates that a number of Aboriginal heritage sites are recorded within the ANSIA.

The following registered Aboriginal heritage sites as shown in Figure 17 were recorded entirely within or intersecting the investigation area.

The Aboriginal heritage provisions include the requirement for a site identification survey, and where applicable a site management plan addressing heritage values to accompany a planning application.



10.3 European Heritage

A search of the Heritage Council's *inHerit* database and the Shire of Ashburton's Municipal Heritage Inventory identified one heritage site within the ANSIA.

Figure 18 shows that the portion of the Old Onslow town site (Place Number 03444) heritage place that intersects the ANSIA. This portion of the heritage place is associated with a tramway that connected the former Onslow town site, on the banks of the Ashburton River, to the former jetty site. Additionally, cast iron telegraph poles, fence posts and various artefact sites are located within this portion of the heritage place (Chevron 2010).

The European heritage provisions include the requirement for development applications within or adjacent to places of heritage value to address potential impacts.

10.4 Human Health

10.4.1 Potential Contamination

A search of the DER's *Contaminated Sites* database found no matches for the ANSIA project study area. Given that the ANSIA is comprised primarily of native vegetation, it is considered unlikely that significant contamination would be present.



11.0 KEY ENVIRONMENTAL FACTORS IDENTIFIED

This section details potential impacts to the key environmental factors identified and how these will be managed during the next project planning and design phase.

<u>Environmental Objective</u> – The environmental issue is placed in context of the appropriate policy framework.

<u>Potential Impacts</u> – Describes the identified potential environmental impacts that might arise from future industrial development. This may take the form of impacts of the development on the environment, or constraints the environment might represent to future development.

<u>Management Response</u> – Details the environmental management plans proposed and the specific requirements of each management plan to address the potential environmental impacts that might arise from future industrial development.

11.1 Sea-themed Factor

11.1.1 Marine Turtles

11.1.1.1 Environmental Objective

To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.

11.1.1.2 Policy and Standards

- Environmental Protection Act 1986.
- Wildlife Conservation Act 1950.
- Environment Protection and Biodiversity Act 1999.
- Environmental Assessment Guideline No. 5: Protecting Marine Turtles from Light Impacts (EPA 2010).

11.1.1.3 Potential Impacts

Future industrial development within the Strategic Industry Zone of the ANSIA has the potential to contribute to cumulative light impacts (skyglow), to the existing night light environment of Ashburton River Delta Beach, which may potentially disrupt turtle nesting.



II.I.I.I Management Response

Potential environmental impacts to marine turtles will be addressed by requiring any future planning applications within the Strategic Industry Zone that may have a significant impact on marine turtles to undertake Baseline lighting studies. The purpose of this study will be to inform the expected cumulative lighting impacts from the proposed industrial development upon marine turtles nesting on the Ashburton River Delta Beach.

Guide Plan

The Guide Plan, as relevant, will require future proponents within the Strategic Industry Zone to undertake a Marine Turtle Baseline Lighting Study in support of any applications for planning approval (see Section 4.1).

Should the Marine Turtle Baseline Lighting Study predict potential significant impacts from lighting on marine turtles from development, then the preparation and implementation of Design Guidelines for reducing light emissions will be required (see Section 4.2).

11.2 Land-themed Factors

11.2.1 Flora and Vegetation

11.2.1.1 Environmental Objective

To maintain representation, diversity, viability and ecological function at the species, population and community level.

11.2.1.2 Applicable Legislation and/or Guidelines

- Wildlife Conservation Act 1950.
- Environmental Protection Act 1986.
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004.
- Position Statement No. 2: Environmental Protection of Native Vegetation in Western Australia (EPA 2000).
- Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a).
- Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia (EPA 2004c).



11.2.1.3 Potential Impacts

Specific conclusions based on the terrestrial flora and vegetation review are summarized below:

- No Declared Threatened Flora species were recorded.
- Four Priority 3 Flora species *Eleocharis papillosa* (P3), *Eremophila forrestii* subsp. *viridis* (P3), *Triumfetta echinata* (P3), and *Atriplex flabelliformis* (P3) were recorded. These species were associated with particular vegetation associations and landforms that coincide with the crests and ridges of inland sand dunes.
- No TECs or PECs were identified within the survey areas.
- Of the 33 vegetation sub-associations identified, three were ranked as High conservation priority and one was ranked as Medium conservation priority (Table 10), due to their susceptibility to erosion and/or weed invasion, and provision of habitat to Priority Flora species (Biota 2010a; Biota 2010b). These consisted of two inland sand dune units, one clay pan unit and one clayey plain unit.

Therefore, in light of the above conclusions the key potential environmental impacts on terrestrial flora and vegetation from the development of the project study area include:

- clearing of terrestrial vegetation
- impacts on Priority flora species
- introduction and distribution of weed species
- unnecessary clearing
- hydrological changes.

11.2.1.4 Management Response

Potential environmental impacts to flora and vegetation will be addressed using the mitigation sequence (i.e. avoidance, minimise, rectify, reduce, offset) and through the preparation and implementation of the following environmental management plans:

- Construction Environmental Management Plan
- Terrestrial Flora and Vegetation Management Plan
- Terrestrial Weed Management Plan
- Water Management Plan.

Guide Plan

The Guide Plan will require future proponents as part of the next planning phase, which in this instance is subdivision design and approval, as relevant, to prepare:

- Construction Environmental Management Plan
- Terrestrial Flora and Vegetation Management Plan



- Terrestrial Weed Management Plan
- Water Management Plan.

Proposed Development on Land Not Surveyed

With respect to proposed development on land that has not been subject to biologically surveys, the Guide Plan will require future proponents to carry out a Terrestrial Flora and Vegetation Survey in support of any applications for planning approval.

11.2.2 Terrestrial Fauna

11.2.2.1 Environmental Objective

To maintain representation, diversity, viability and ecological function at the species, population and assemblage level.

11.2.2.2 Applicable Legislation and/or Guidelines

- Wildlife Conservation Act 1950.
- Environmental Protection Act 1986.
- Environment Protection and Biodiversity Conservation Act 1999.
- Environmental Protection (Clearing of Native Vegetation) Regulations 2004.
- Position Statement No. 3: Terrestrial Biological Surveys as an Element of Biodiversity Protection (EPA 2002a).
- Guidance Statement No. 20: Sampling of Short Range Endemic Invertebrate Fauna for Environmental Impact Assessment in Western Australia (EPA 2009).
- Guidance Statement No. 56: Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia (EPA 2004d).

11.2.2.3 Potential Impacts

Specific conclusions based on the terrestrial fauna review are summarised below:

- There is low likelihood of terrestrial conservation significant fauna species being dependent upon the habitats identified within the ANSIA for continuing survival.
- There is a low risk that part of the ANSIA may have at least some habitat value for the northern quoll. Bamford (2009b) identifies the low rocky hills in the south-east of the Macedon project area did not contain small caves and crevices that this species favours, however noted that the lower reaches of the Ashburton River,



approximately 2 km west of the site, may provide suitable habitat for this species. No habitat critical to the survival of the northern quoll has been identified or is expected to occur within the site and the terrestrial habitat within the ANSIA is not restricted to the site's boundaries.

- The key finding of Bamford (2009a) was that the Wheatstone project area and surrounding areas do not support important numbers of migratory waterbirds with potential impacts upon migratory waterbirds likely to be low. The terrestrial habitats within the ANSIA are of limited habitat value and are unlikely to support significant numbers of migratory waterbirds and therefore, the risk of significant impact occurring to migratory waterbird species due to future industrial development is low.
- There is a low risk that significant clay pan fauna diversity values would be compromised; that troglobitic species could occur and that stygal fauna would be restricted to the ANSIA.

The remainder of species identified on site or potentially occurring on site were not considered likely to be impacted due to their ability to move away from disturbances.

Potential impacts to fauna on the site are summarised below:

- animal deaths during the clearing process and the destruction of burrows and retreat sites
- habitat fragmentation
- an increased abundance of introduced species (cats and wild dogs)
- road fauna deaths, in particular this is likely to impact kangaroos, nocturnal birds and ground dwelling large carnivorous predators.

11.2.2.4 Management Response

Potential environmental impacts to fauna will be addressed at subdivision using the mitigation sequence (i.e. avoidance, minimise, rectify, reduce, offset) and through the preparation and implementation of the following environmental management plans:

- Construction Environmental Management Plan
- Terrestrial Fauna Management Plan
- Terrestrial Weed Management Plan.



Guide Plan

The Guide Plan, as relevant, will require future proponents to prepare a Construction Environmental Management Plan, Terrestrial Fauna Management Plan and Terrestrial Weed Management Plan as part of the next planning phase, which in this instance is subdivision design and approval.

Proposed Development on Land Not Surveyed

With respect to proposed development on land that has not been biologically surveyed, the Guide Plan will require future proponents to carry out a Terrestrial Fauna Survey in support of any applications for planning approval.

11.2.3 Terrestrial Environmental Quality - Acid Sulfate Soils

11.2.3.1 Environmental Objective

To maintain the quality of land and soils so that the environmental values, both ecological and social, are protected.

11.2.3.2 Applicable Legislation and/or Guidelines

- Environmental Protection Act 1986.
- Contaminated Sites Act 2003.
- Assessment Levels for Soil, Sediment and Water (Department of Environment and Conservation (DEC) 2010).
- Acid Sulfate Soils Guideline Series. Treatment and Management of Soils and Water in Acid Sulfate Soil Landscapes (DEC 2011).
- Identification and Investigation of Acid Sulfate Soils and Acidic Landscapes (DER 2013).

11.2.3.3 Potential Impacts

The majority of the industrial areas have no know ASS mapped across them, however the drainage lines have been mapped as having a high risk of ASS.

11.2.3.4 Management Response

If ASS is identified as occurring and is proposed to be disturbed by construction works, a detailed Acid Sulfate Soil and Dewatering Management Plan is required to be prepared to the satisfaction of the WAPC on advice from the DER.



The objectives of the Acid Sulfate Soil and Dewatering Management Plan will be to adequately identify "actual" and "potential" acid sulfate soils and determine appropriate management strategies and construction practices to be followed to ensure effective handling, treatment and disposal of acid sulfate soils and produced water.

Guide Plan

The Guide Plan, as relevant, will require future proponents to prepare an Acid Sulfate Soil and Dewatering Management Plan as part of the next planning phase, which in this instance is subdivision design and approval.

11.3 Water-themed Factors

11.3.1 Hydrological Processes

11.3.1.1 Environmental Objective

To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.

11.3.1.2 Applicable Legislation and/or Guidelines

- Environmental Protection Act 1986.
- Rights in Water and Irrigation Act 1914.
- Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC & ARMCANZ 2000).
- Pilbara Coastal Water Quality Consultation Outcomes: Environmental Values and Environmental Quality Objectives (DoE 2006).
- State Planning Policy 2.9: Water Resources (WAPC 2006b).
- Better Urban Water Management (WAPC 2008).

11.3.1.3 Potential Impacts

Potential impacts to hydrology on the site include:

- groundwater level changes that occur as a result of a change in land use
- removal of vegetation and installation of impervious surfaces that lead to an increase in run-off during rainfall events



- development may result in an increase in the potential for industrial generated pollutants, such as nutrients, hydrocarbons, litter and sediment, being transported, through surface water run-off, into the local storm water drainage system
- development may result in changes to surface water flows.

In terms of potential impacts to proposed development on the site due to on-site hydrological conditions, the subject land may be impacted by flooding during high rainfall or less frequent extreme events, such as tropical cyclones (during site surveys, parts of the site were flooded due to high rainfall).

11.3.1.4 Management Response

Guide Plan

The Guide Plan, as relevant, will require future proponents to prepare a Water Management Plan as part of the next planning phase, which in this instance is subdivision design and approval.

The specific requirements of the Water Management Plan are included within the Guide Plan and detailed in the LWMS.

11.4 People-themed Factors

11.4.1 Aboriginal Heritage

11.4.1.1 Environmental Objective

To ensure that historical and cultural associations, and natural heritage, are not adversely affected.

11.4.1.2 Applicable Legislation and/or Guidelines

- Aboriginal Heritage Act 1972.
- Heritage of Western Australia Act 1990.
- Native Title Act 1993.
- Department of Aboriginal Affairs: Due Diligence Guideline (April 2013).
- Guidance Statement No. 41: Assessment of Aboriginal Heritage (EPA 2004b).

11.4.1.3 Potential Impacts

A search of the DAA Aboriginal Heritage Enquiry System was undertaken in June 2015 and it indicates that approximately 109 Registered Aboriginal Sites are located within vicinity of the ANSIA (Figure 17).



11.4.1.4 Management Response

- I. In the event that the application for planning approval involves activities that will result in the disturbance of sites, approval for these activities must be sought under the Aboriginal Heritage Act 1972. Where heritage sites of Aboriginal heritage value are to be conserved, cultural heritage management plans to protect the integrity of these site will need to be prepared to ensure compliance with the Aboriginal Heritage Act 1972.
- 2. If there are activities proposed in a planning application that will impact on Aboriginal heritage locations, then consent for these activities must be sought through Section 18 of the *Aboriginal Heritage Act 1972* prior to any ground disturbing activities are undertaken.



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12.0 CONCLUSIONS

A key conclusion of this Environmental Assessment Report is that, based on RPS' experience in the region, none of the identified key environmental risk factor alone present as being a "fatal flaw" to the development of the ANSIA.

Based on a high-level review, the key environmental factors (or risks) identified include:

- flora and vegetation
- terrestrial fauna
- hydrological process.

Other environmental factors identified include:

- terrestrial environmental quality acid sulfate soil
- Aboriginal heritage.

12.1 Environmental Management Framework

There are a number of environmental factors identified in this and historical assessment by the EPA. As part of the ANSIA project consultation process a summary of the historical biological surveys was provided to the Office of the Environmental Protection Authority (OEPA).

The OEPA advised that the survey information provided for projects within the ANSIA are sufficient for the areas they cover. However, on land that has not been zoned for development, the OEPA has recommended the following:

- A Level I flora survey consistent with Guidance Statement 51 (EPA 2004) should be conducted across the areas that have not been mapped and/or ground-truthed. Vegetation mapping by Biota (2010a) and Outback Ecology Services (2010) (reported in Biota 2010b) should be extrapolated across the unsurveyed areas a desktop exercise. Ground-truthing should then be conducted for this mapping as well as the areas that were mapped by Biota (2010b) through aerial photography interpretation but were not ground-truthed.
- A targeted flora survey is required in the habitats likely to support the conservation significant flora identified in previous surveys.
- Surveys and ground-truthing should be conducted in the appropriate seasons.
- A Level I fauna assessment is to be undertaken to map fauna habitats across the study area as recommended by the "Ashburton North Strategic Industrial area Biological Desktop Review" (ENV 2012b).



A targeted Level 2 fauna survey to determine the presence of any of the significant fauna species that are predicted by ENV (2012c) or RPS (2014b) as likely to occur.

Other key environmental issues such as hydrological process and terrestrial environmental quality are capable of being resolved (i.e. avoided or managed) through site-specific investigations and detailed engineering drainage design.

At a future time when the nature and land requirements for industrial development(s) are more comprehensively known (i.e. detailed planning design/ subdivision stage) the developments will be subject to the following environmental Scheme Provisions.

If applicable, Scheme text to set out environmental conditions applicable to the Scheme as a result of an assessment carried out under the *Environmental Protection Act 1986* Part IV Division 3. If no environmental conditions apply, the Scheme text will state, "There are no environmental conditions imposed under the *Environmental Protection Act 1986* that apply to this Scheme".

Development shall be in accordance with the following environmental requirements (as relevant):

- Fire Management Plan
- Construction Environmental Management Plan
- Mosquito Management Plan
- Terrestrial Flora and Vegetation Survey (if required i.e. outside of the existing biological survey areas e.g. Industry Protection Zone)
- Terrestrial Fauna Survey (if required i.e. outside of the existing biological survey areas)
- Terrestrial Weed Management Plan
- Marine Turtle Baseline Lighting Survey and Design Guidelines (if required) Strategic Industry Area
- Water Management Plan
- Acid Sulfate Soil and Dewatering Management Plan
- Noise and Air Quality Management Plan Strategic Industry Area



Noise and Air Quality Management Plan (addressing EPA Guidance Statement No.
 3 – Separation Distances between Industrial and Sensitive Land Uses) – General Industry Area.

Due regard shall be given to any:

- 1. Any applicable operating licence granted under Part 5 of the EP Act.
- 2. Any previous advice provided by the EPA as a result of Section 38 and 48 Referrals.

Table 2 provides a summary of the environmental factors and objectives, the potential impacts, and proposed management measures.

12.1.1 Additional Proponent Environmental Considerations

12.1.1.1 Commonwealth EPBC Act

This assessment also identified potential impacts to MNES (e.g. northern quoll). Subject to further project planning and site-specific design detail, a referral and likely Ministerial approval under the Commonwealth EPBC Act may be required by future proponents.

12.1.1.2 Proponent Industrial Buffers

Within the ANSIA, in particular the Strategic Industry Zone, (which is proposed to accommodate mineral and hydrocarbon processing activities) each industrial development proposal will need to assess and accommodate its own risk buffer within its leasehold lot in accordance with the EPA's recommended separation distances. For heavy industrial development proposals (e.g. ammonia processing plant) within the Strategic Industry Zone a specific environmental assessment for example of air quality, noise and human health risk will need to be undertaken in consultation with the EPA as part of a separate referral and assessment under Section 38 of the EP Act. This assessment would also delineate separation distances between industrial developments within the ANSIA.

A DER works approval and licence would also be required for heavy industrial proposals to prevent or minimise the emissions and discharges of waste to the environment.

A likely key outcome for the ANSIA in the Strategic Industry Zone is each industrial development will require a buffer from neighbouring industries. This outcome will create "pods" of industrial development(s), connected by roads and common infrastructure within the ANSIA landscape.



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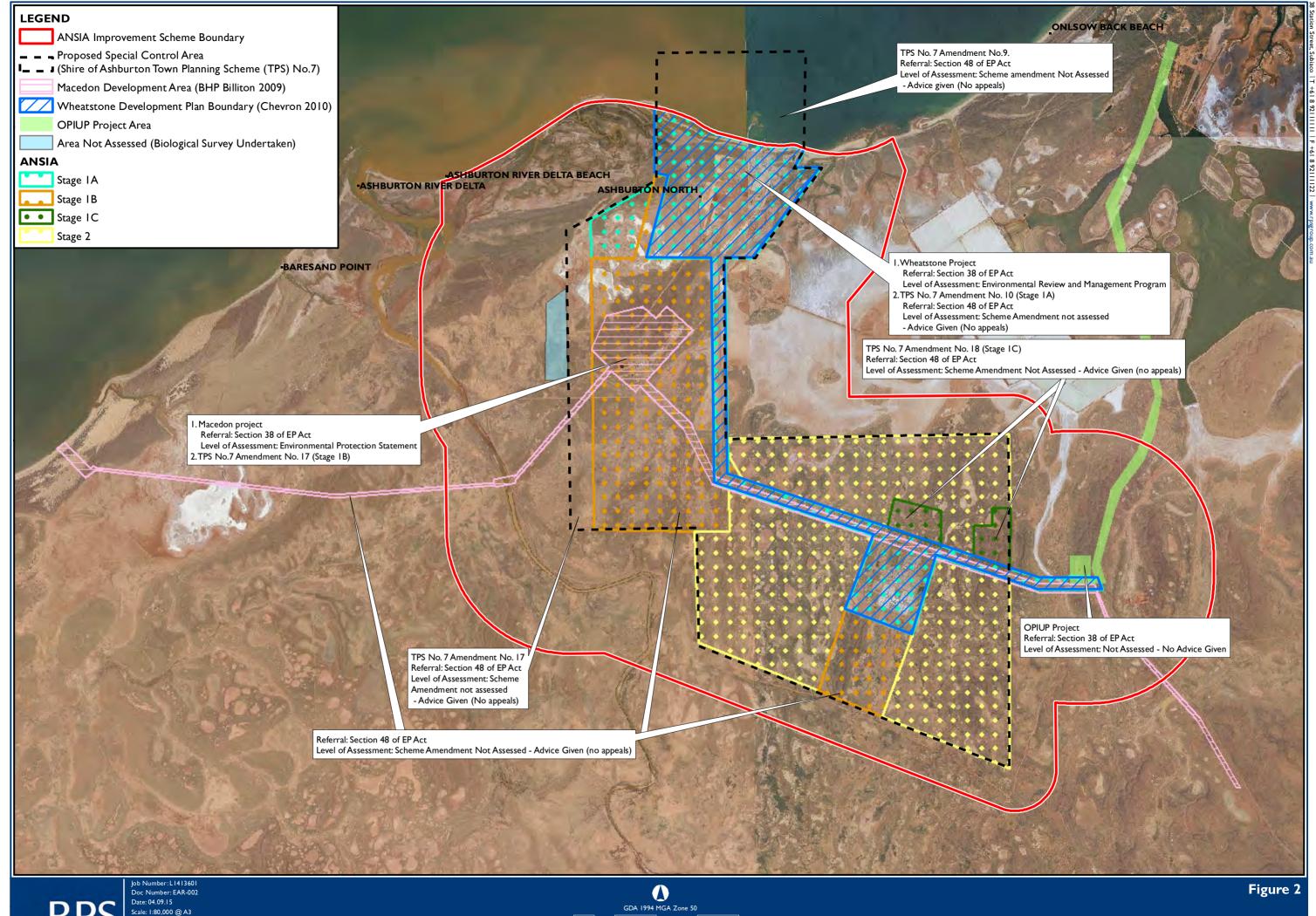


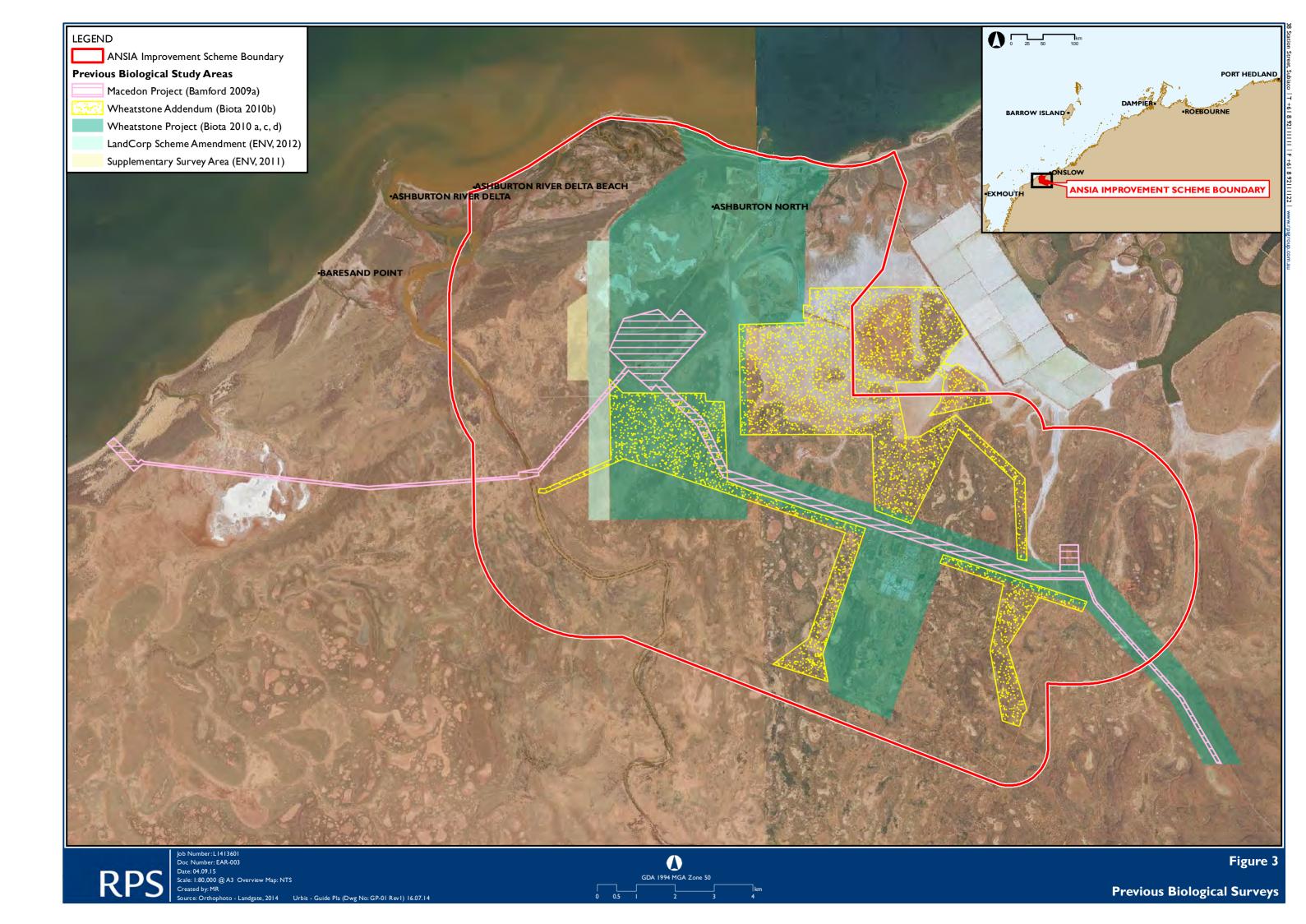
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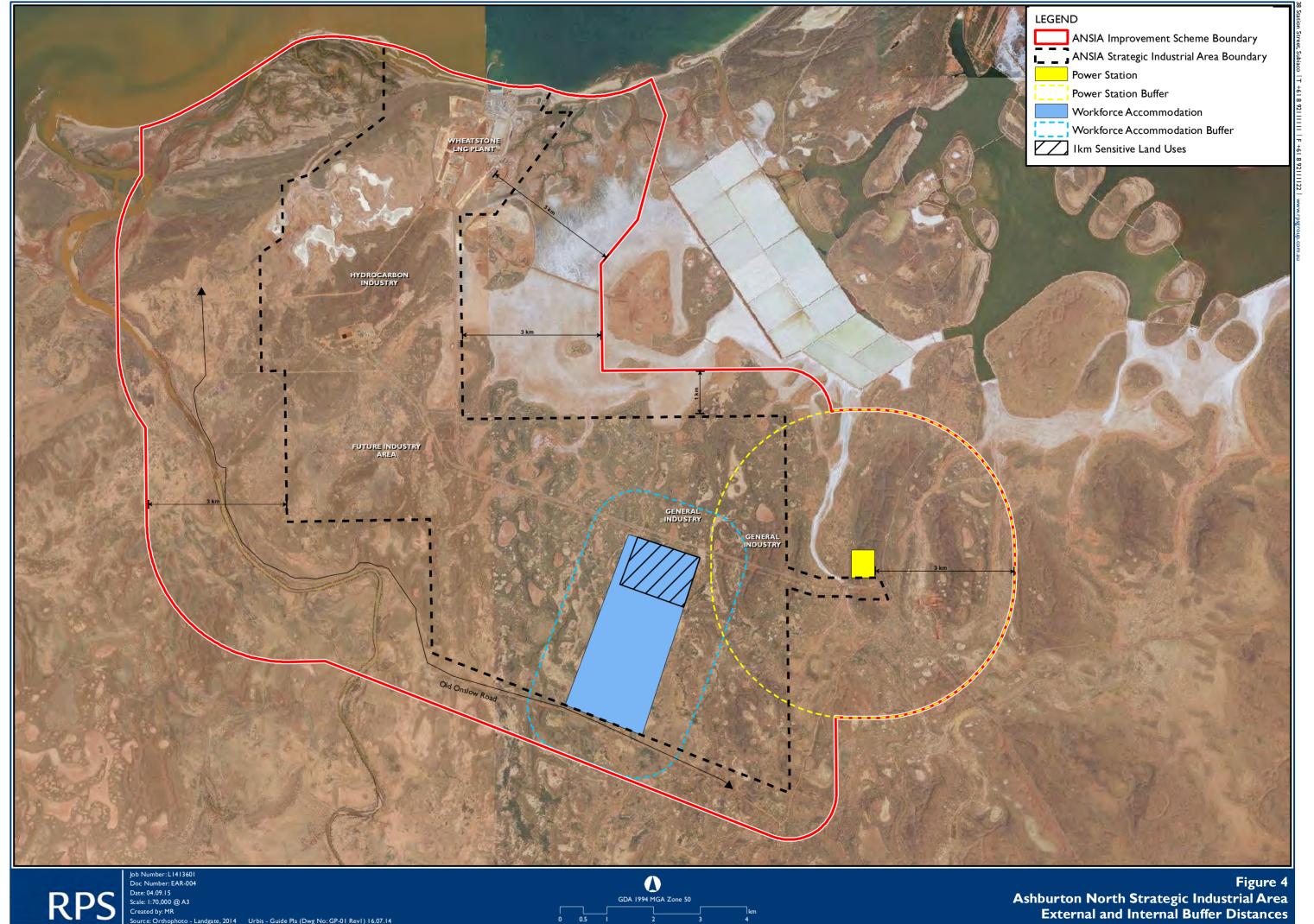


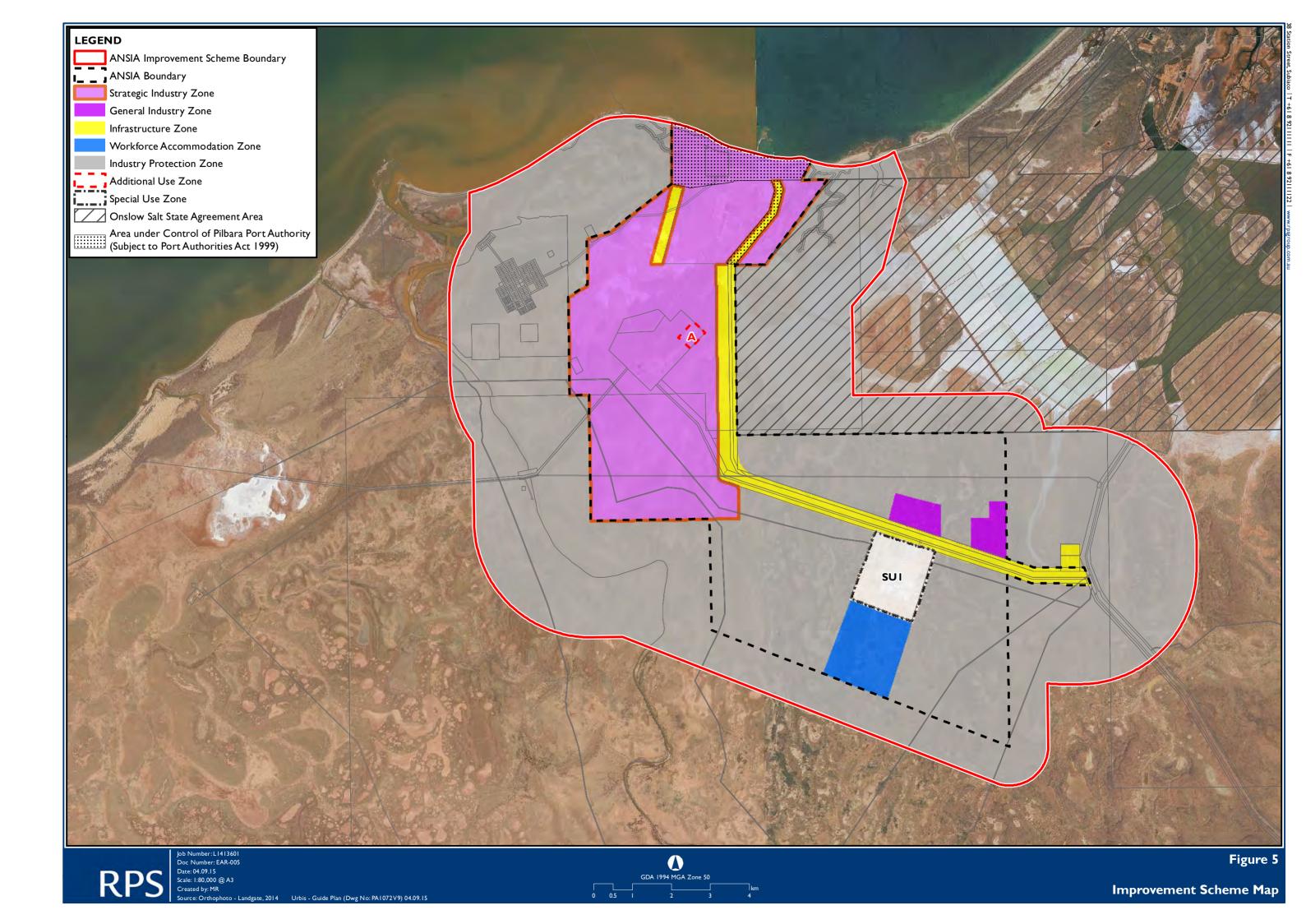
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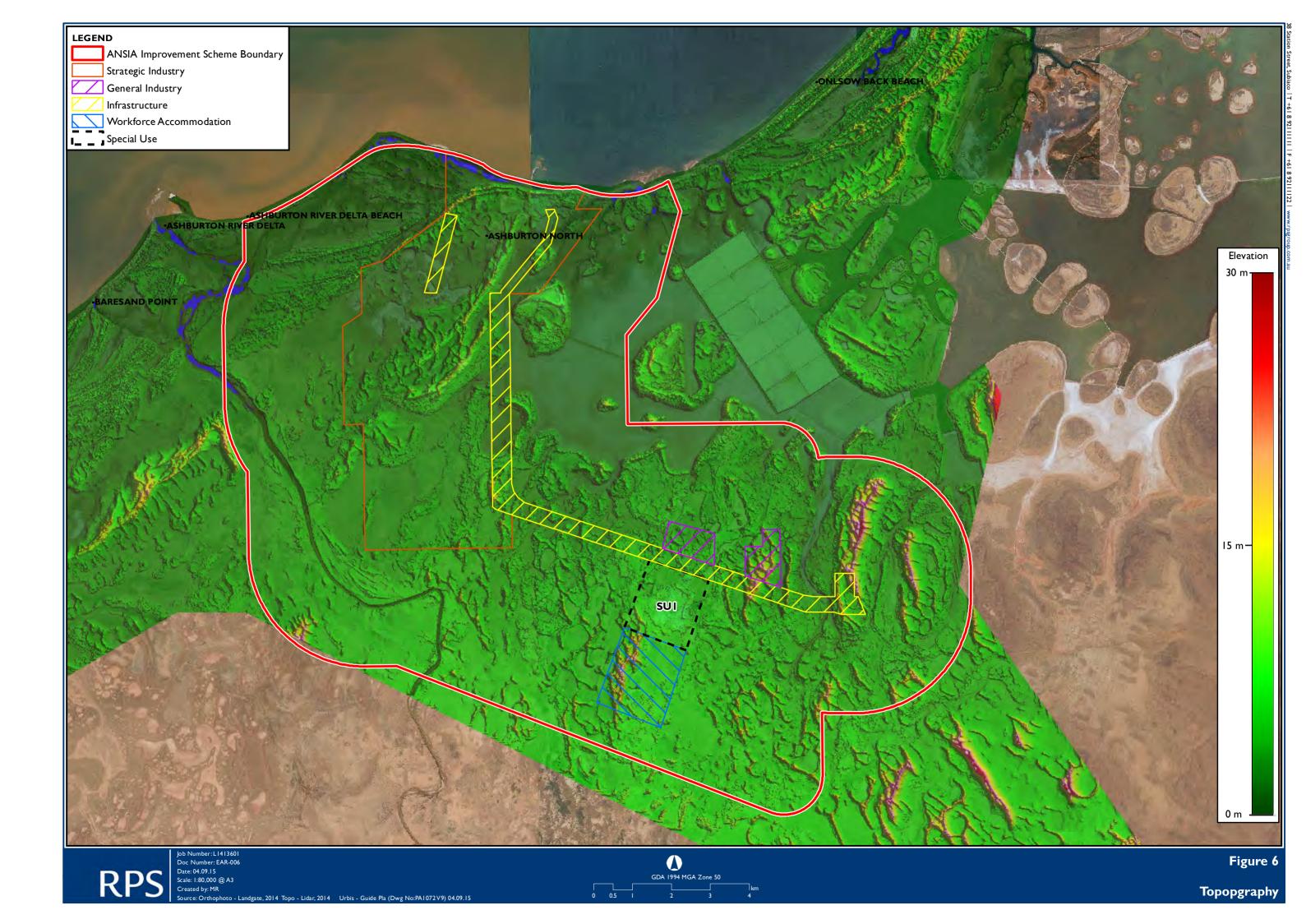




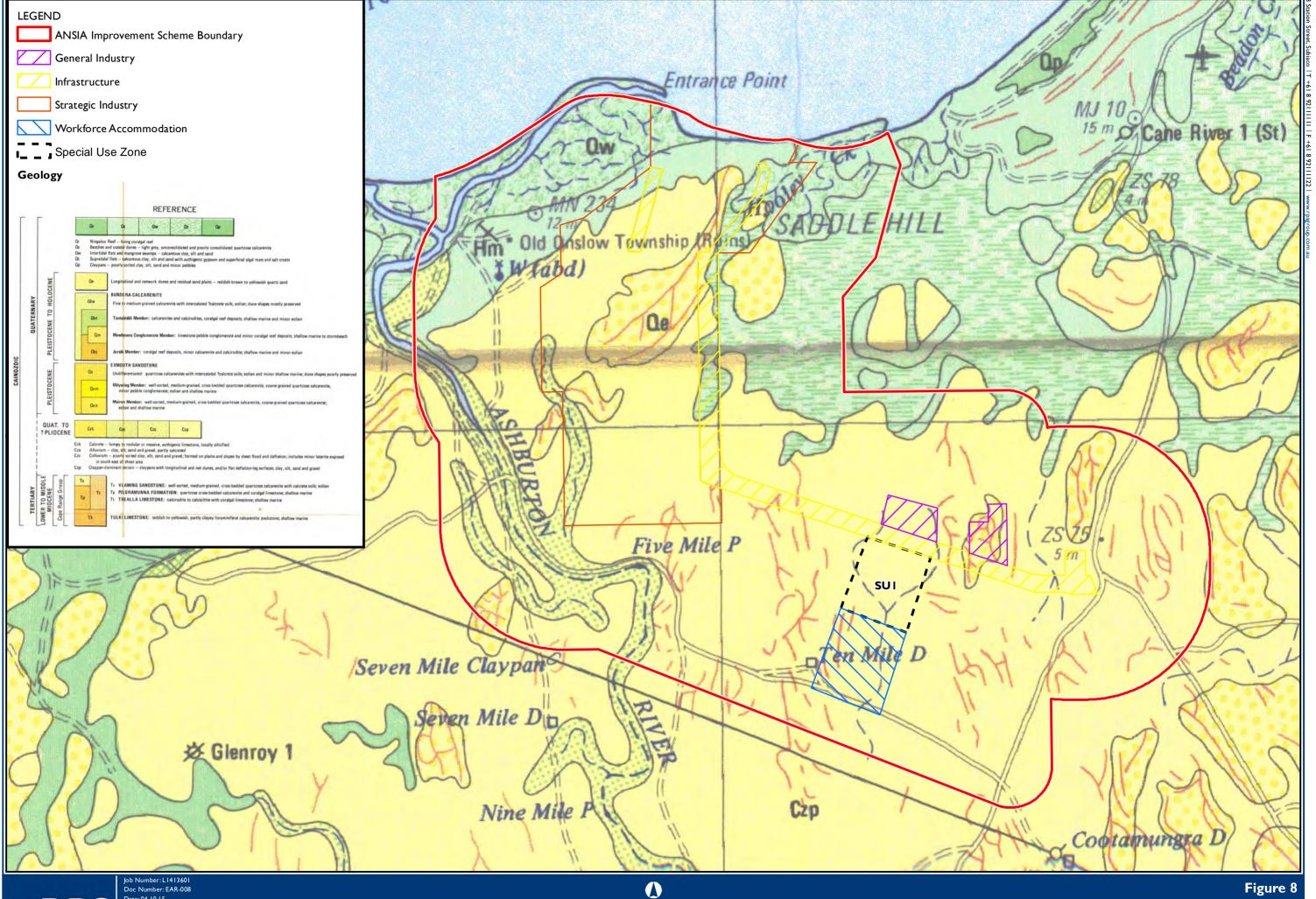




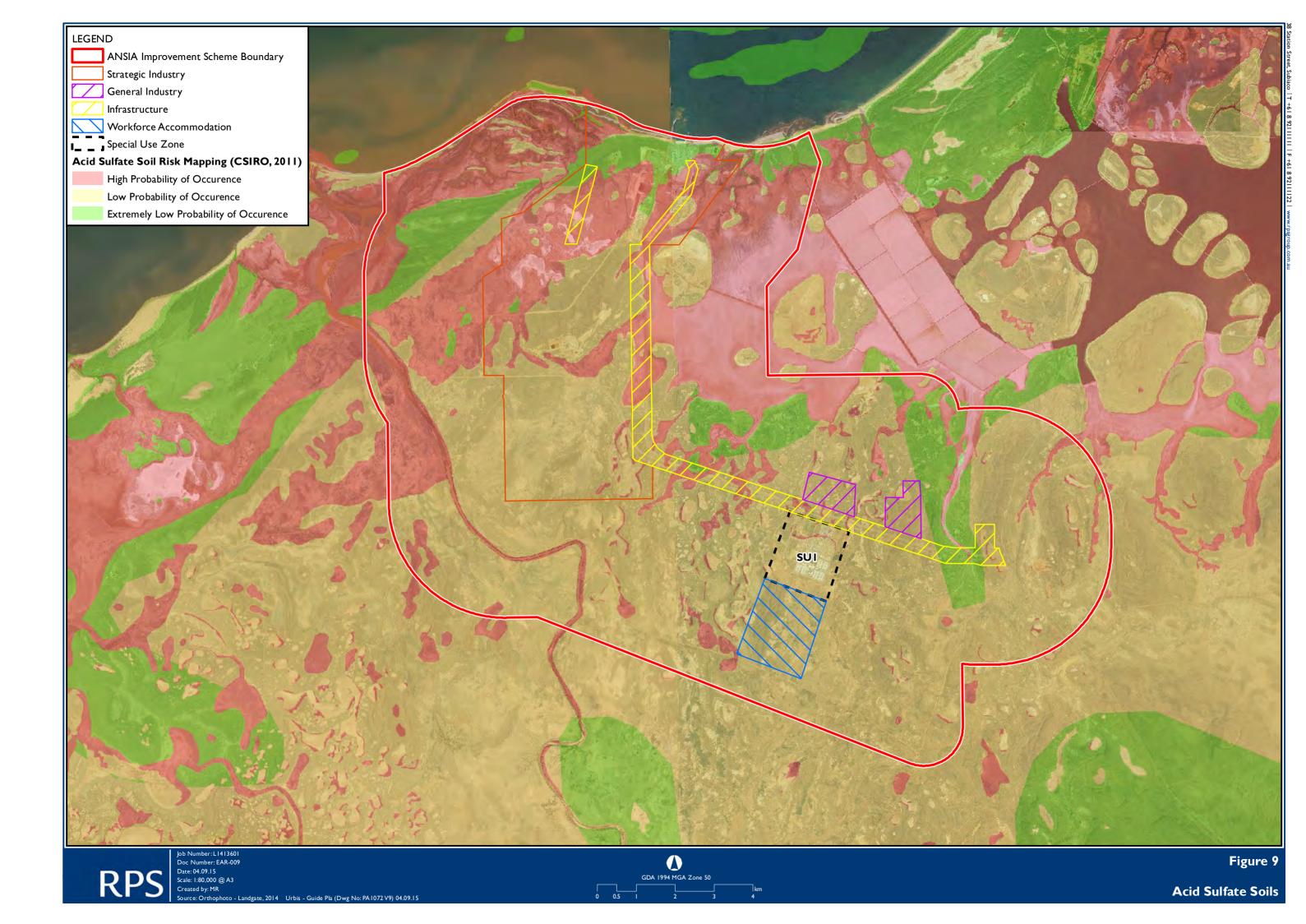


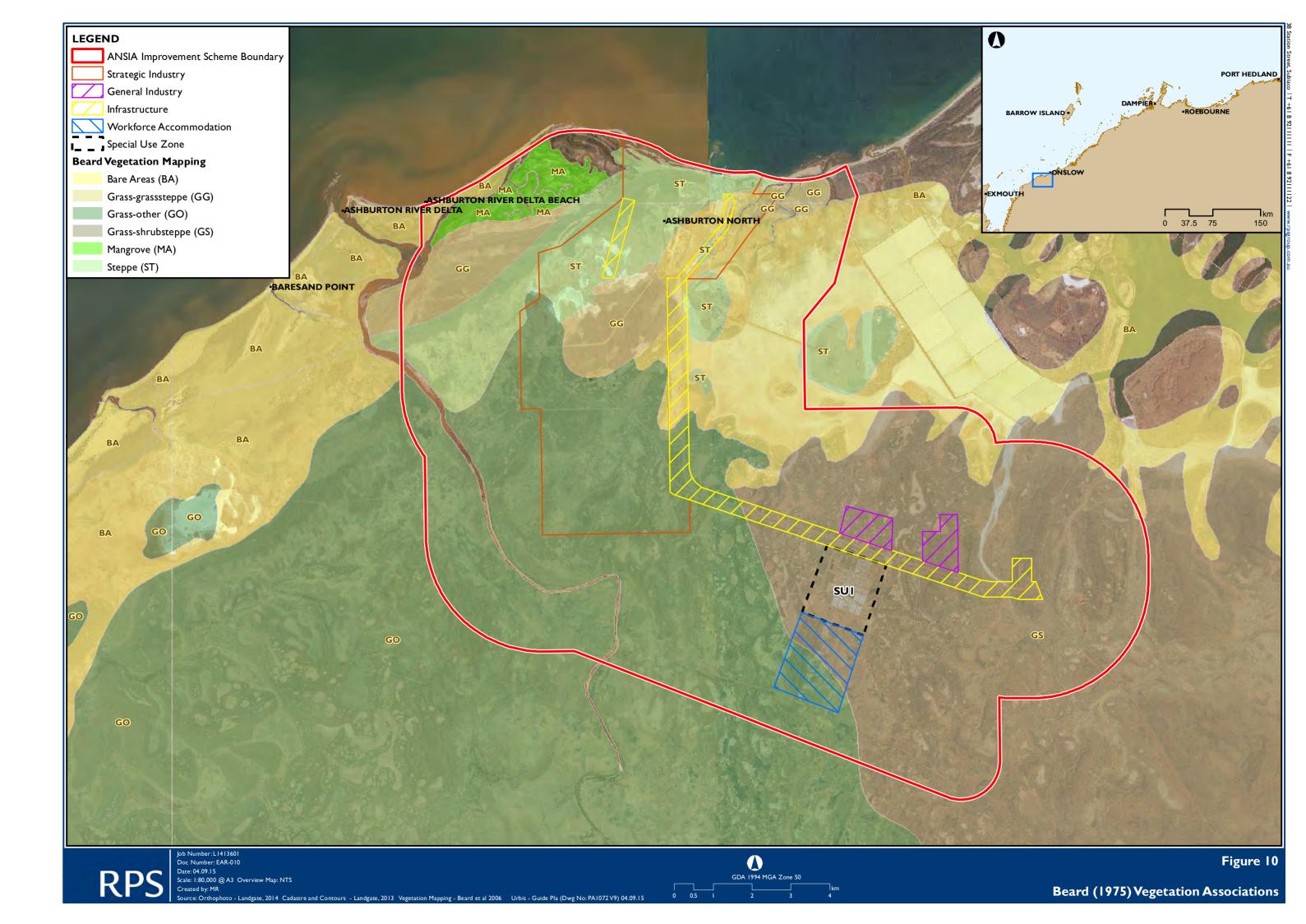


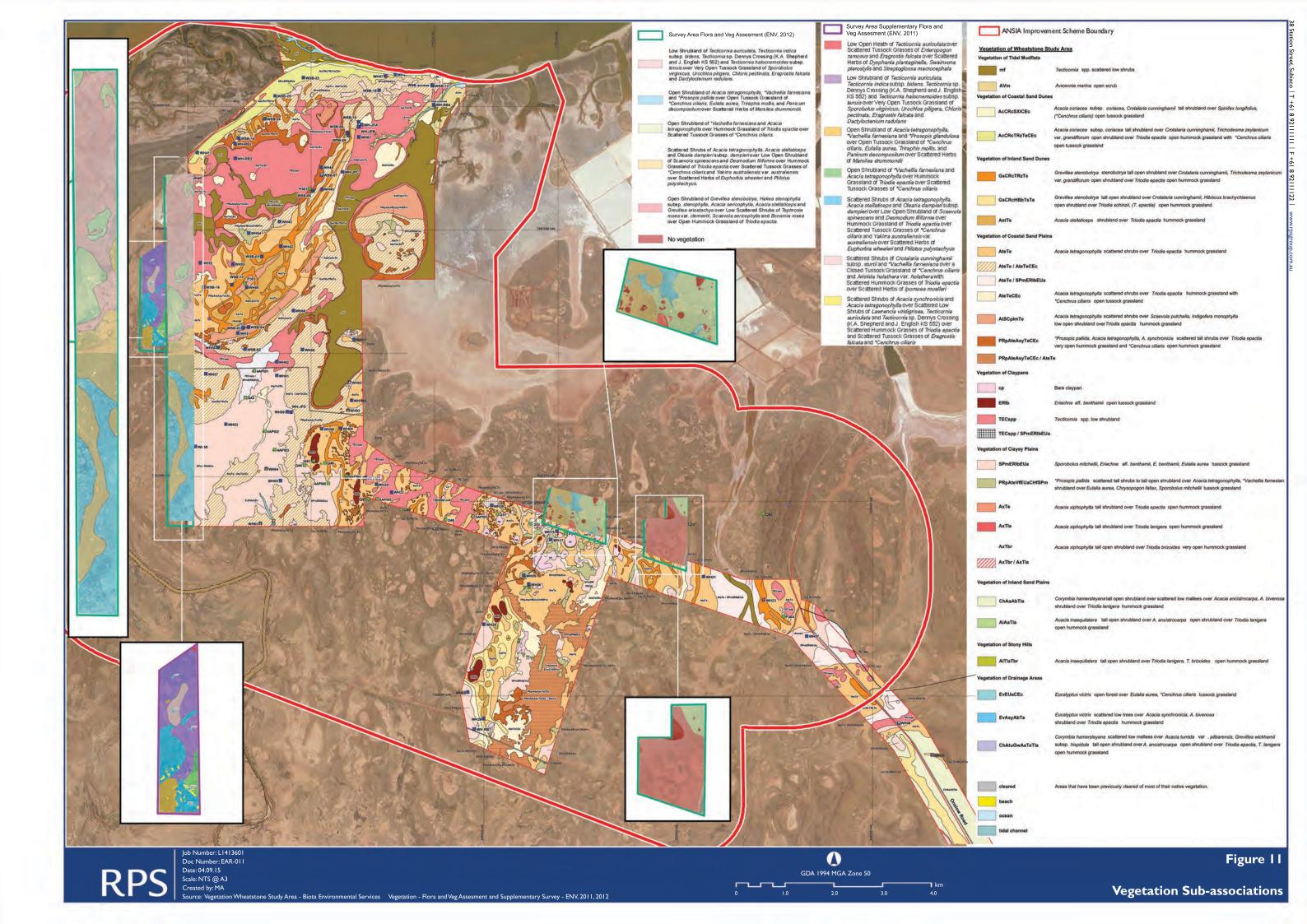




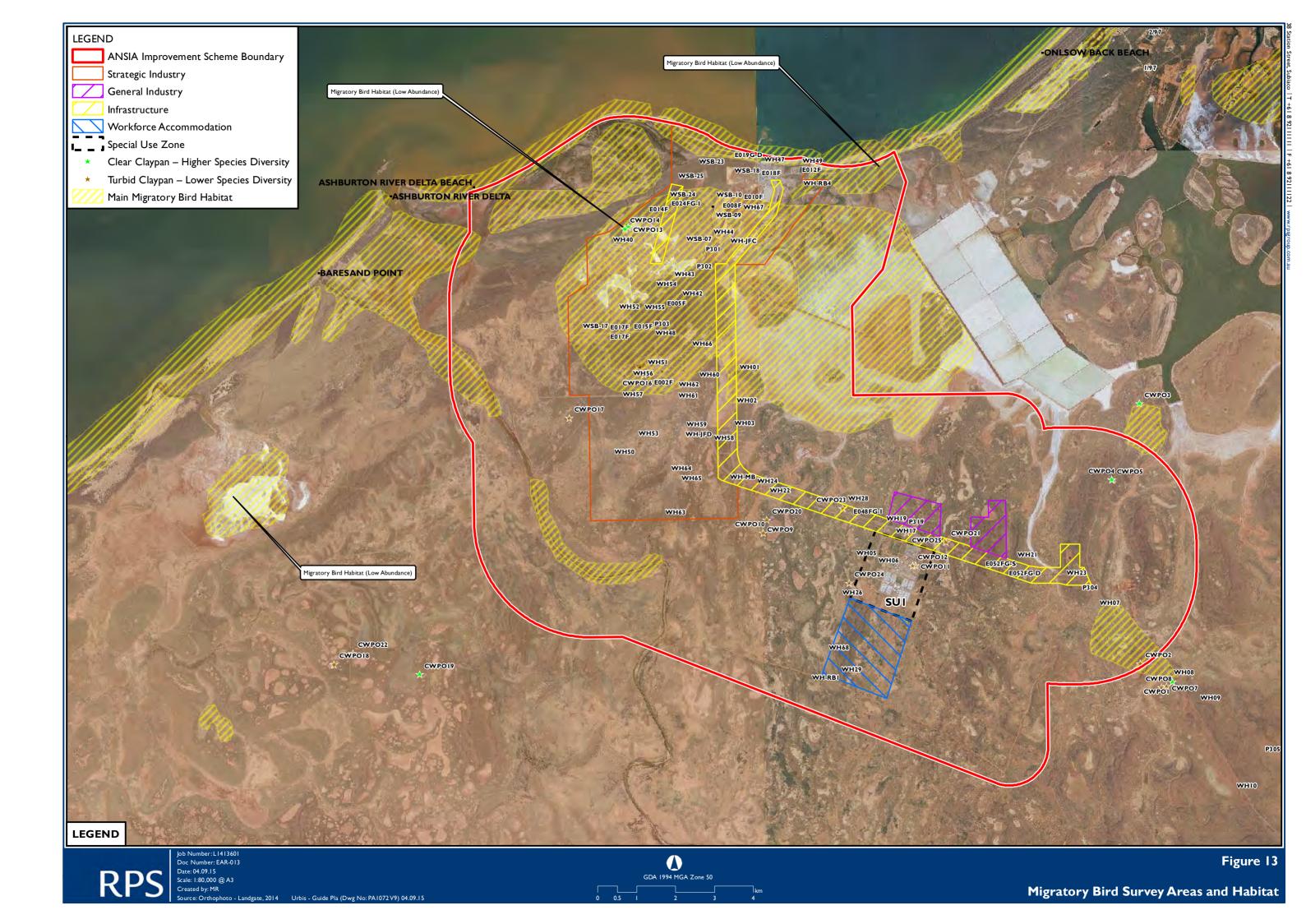
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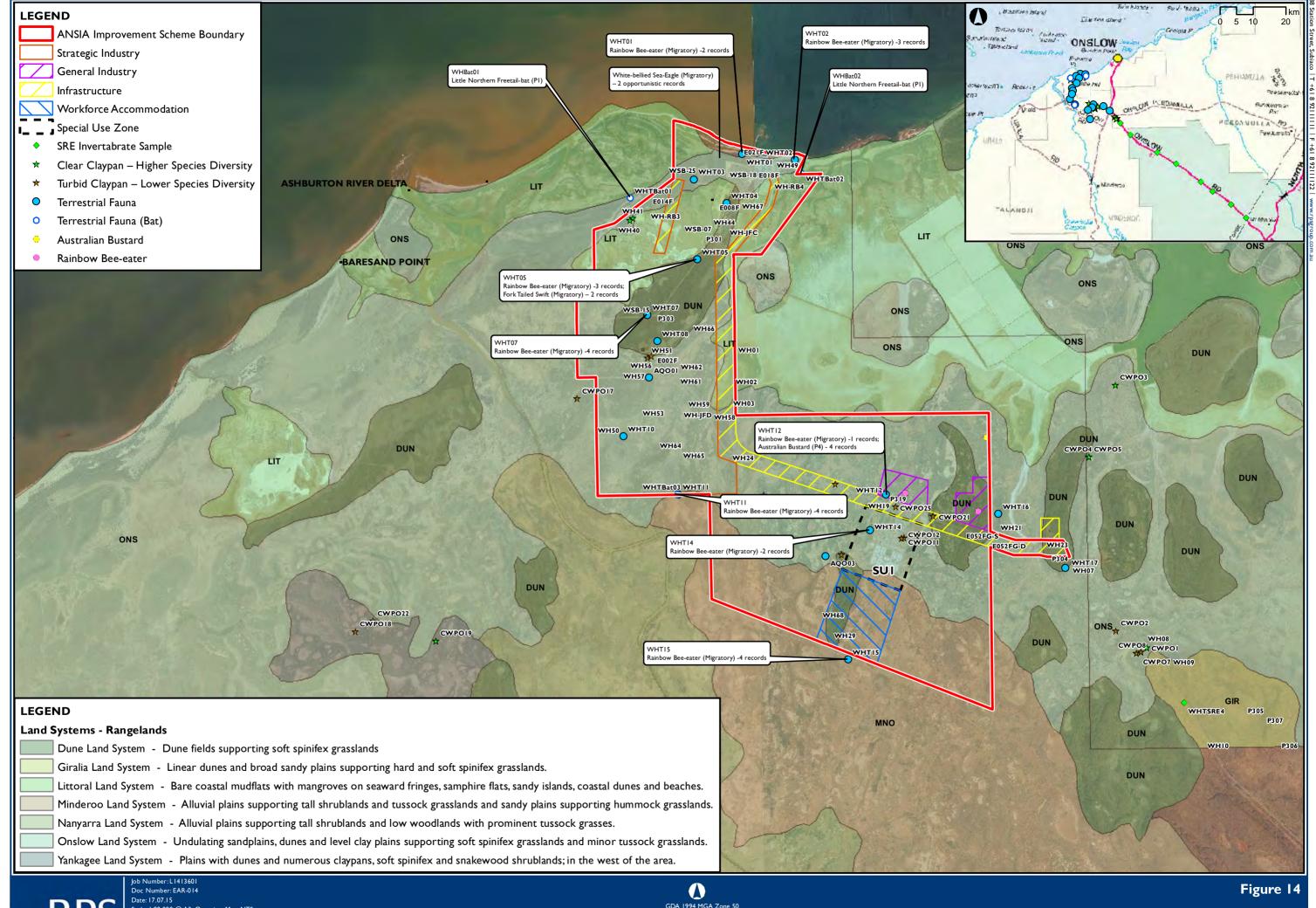


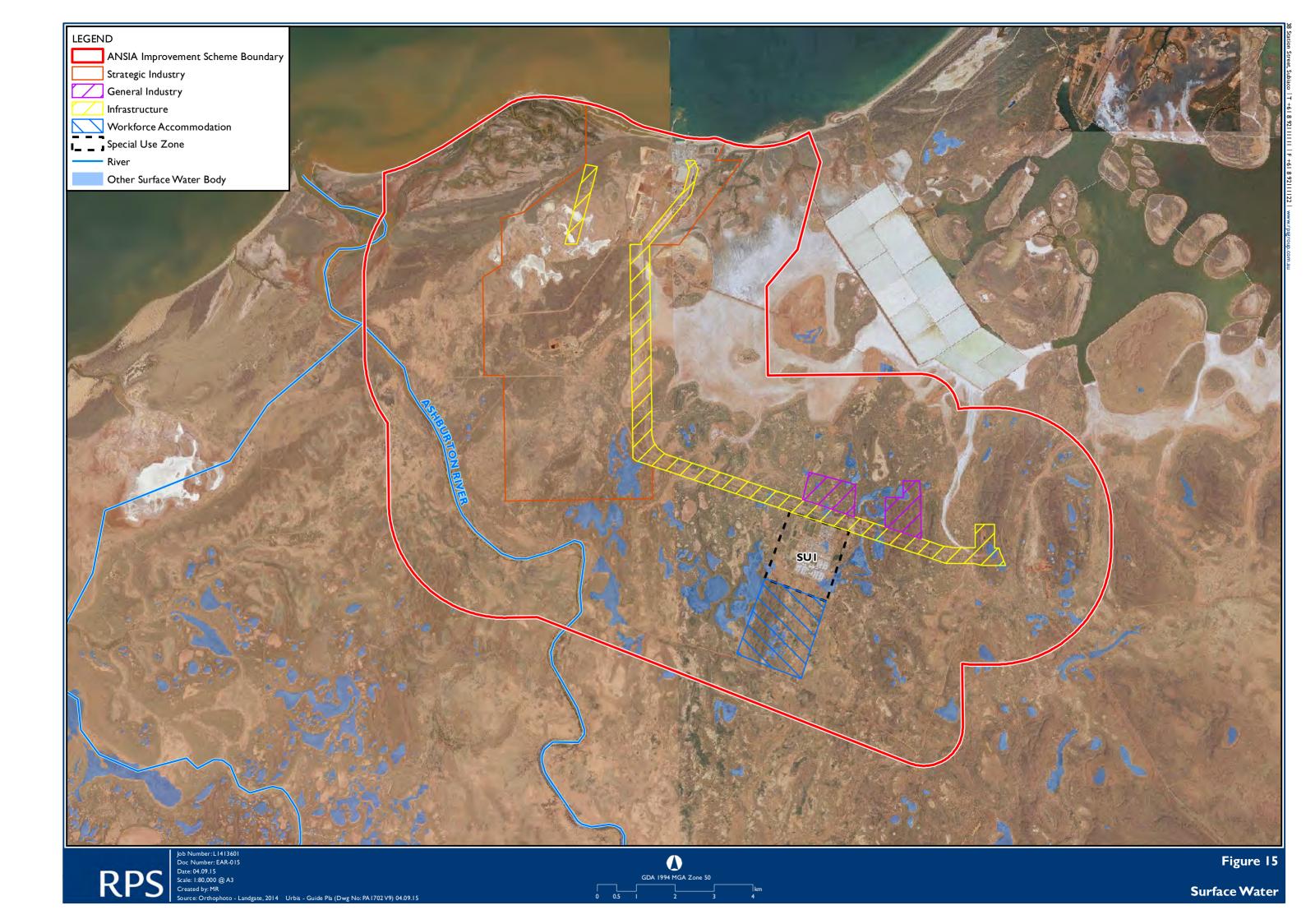


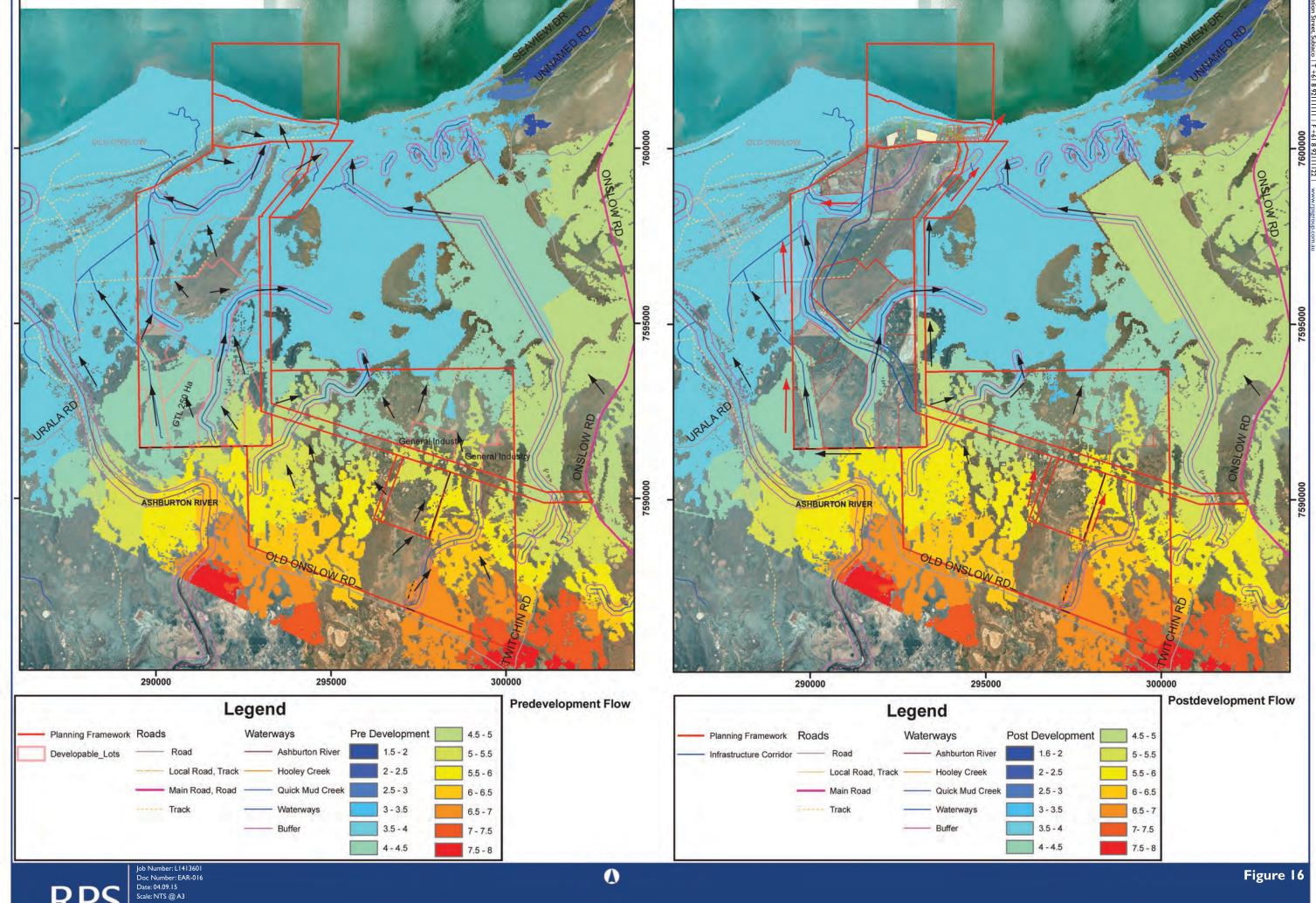


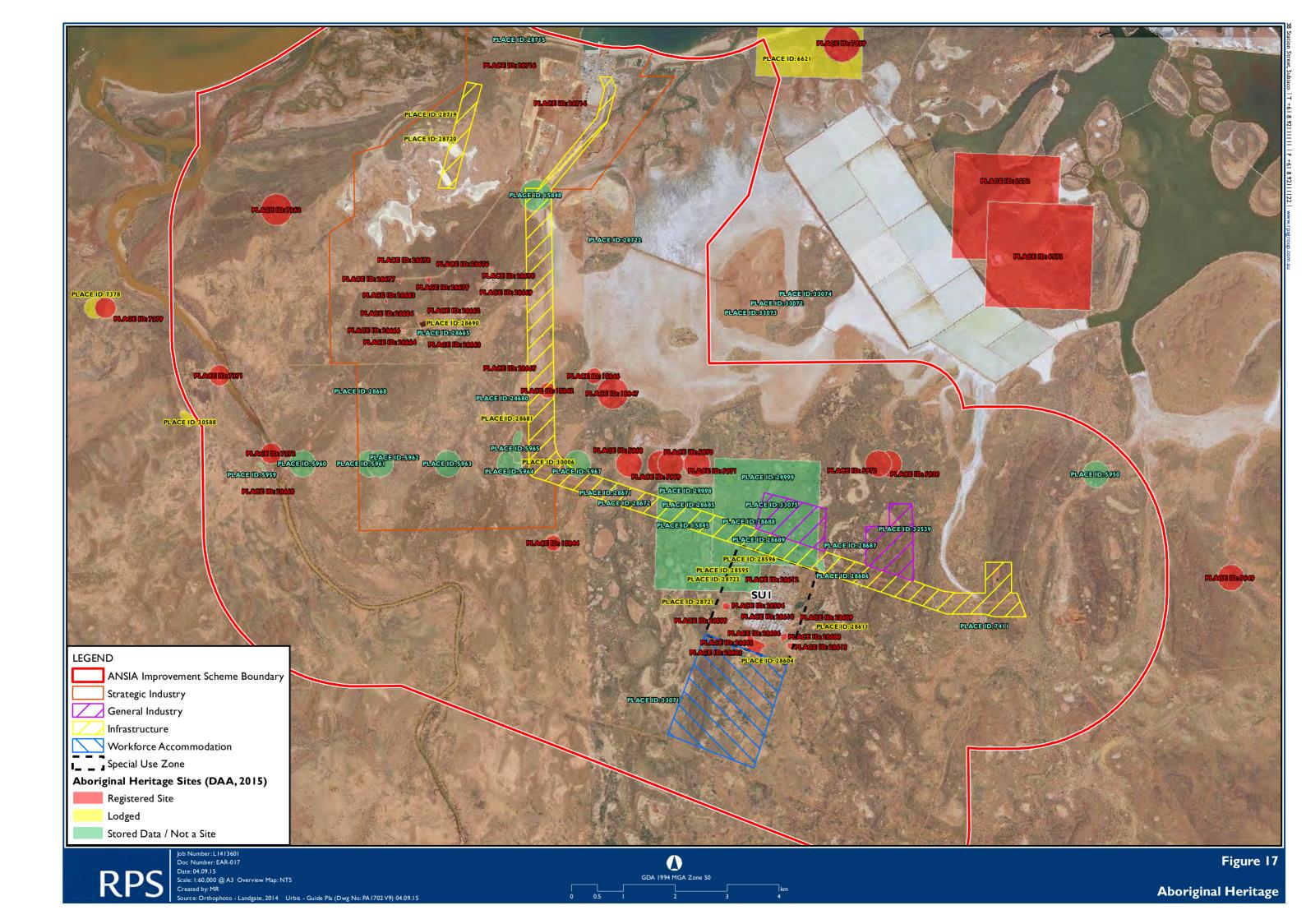
















APPENDIX I

Office of the EPA Advice

Mr John Halleen Technical Director RPS Environment and Planning Pty Ltd 38 Station Street SUBIACO WA 6008 Our Ref: CMS14338: AC04-2014-0240 Enquiries: Stephen Pavey, 6145 0837 Email: stephen.pavey@epa.wa.gov.a

Dear Mr Halleen

ASHBURTON NORTH STRATEGIC INDUSTRIAL AREA AND PROPOSED IMPROVEMENT PLAN: FLORA, VEGETATION AND FAUNA REVIEW

Thank you for your correspondences dated 6 and 19 November 2014 regarding the adequacy of the existing flora and vegetation, and fauna surveys for the development of the Ashburton North Strategic Industrial Area (ANSIA) proposed improvement plan and scheme. The Office of the Environmental Protection Authority (OEPA) has reviewed the information and provides the following advice.

The survey information you provided for projects within the ANSIA are sufficient for the areas they cover. However, as shown in the Flora and Vegetation Review, Figure 1 – Site Location and Existing Biological Surveys, much of the land within the ANSIA boundary has not been surveyed.

Where development is intended on land not yet surveyed, or on land not already zoned for the land use intended under the Shire of Ashburton local planning scheme, the OEPA recommends further flora and vegetation, and fauna surveys be carried out as detailed in Attachment 1.

If you have any queries, please contact me on 6145 0858.

Yours sincerely

Liesl Rohl Manager

Environmental Planning Branch

Lis 1720 W

22 December 2014

cc: Declan Collins, LandCorp

Attachment

ENVIRONMENTAL SURVEY WORK RECOMMENDED FOR THE DEVELOPMENT OF AN IMPROVEMENT PLAN FOR THE ASHBURTON NORTH STRATEGIC INDUSTRIAL AREA

Flora and Vegetation

Where development is intended on land within the ANSIA that has not yet been surveyed, or on land not already zoned for the land use intended under the Shire of Ashburton local planning scheme, the OEPA recommends flora and vegetation survey work as detailed below:

- A Level 1 survey consistent with Guidance Statement 51 (EPA 2004) should be conducted across the areas that have not been mapped and/or ground-truthed. Vegetation mapping by Biota (2010a) and Outback Ecology Services (2010) (reported in Biota 2010b) should be extrapolated across the unsurveyed areas as a desktop exercise. Ground-truthing should then be conducted for this mapping as well as the areas that were mapped by Biota (2010b) through aerial photography interpretation but were not ground-truthed.
- A Targeted flora survey is required in the habitats likely to support the conservation significant flora identified in previous surveys.
- Surveys and ground-truthing should be conducted in the appropriate seasons.

Terrestrial Fauna

Where development is intended on land within the ANSIA that has not yet been surveyed, or on land not already zoned for the land use intended under the Shire of Ashburton local planning scheme, the OEPA recommends fauna surveys as detailed below:

- A level 1 fauna assessment to be undertaken to map fauna habitats across the study area as recommended by the "Ashburton North Strategic Industrial Area Biological Desktop Review" (ENV Australia 2012a)
- A targeted Level 2 fauna survey to determine presence of any of the significant fauna species that are predicted by ENV (2012b) or RPS (2014b) as likely to occur.

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EPA (2004) Guidance for the Assessment of Environmental Factors: Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia.

RPS (2014b) Terrestrial Fauna Review Ashburton North Strategic Industrial Area.



APPENDIX 2

Flora and Vegetation Review: Ashburton North Strategic Industrial Area



FLORA AND VEGETATION REVIEW

Ashburton North Strategic Industrial Area













FLORA AND VEGETATION REVIEW

Ashburton North Strategic Industrial Area

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APPENDICES

APPENDIX I: Priority Codes and Categories of Threatened Species

APPENDIX 2: Results of Database Searches

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1.0 INTRODUCTION

I.I Background

LandCorp is preparing an Improvement Plan for the Ashburton North Strategic Industrial Area (ANSIA), to provide an effective planning framework for the future. The ANSIA Improvement Plan Area is located 10 kilometres (km) south-west of Onslow in the Shire of Ashburton (Figure 1).

The purpose of the Improvement Plan is to establish a framework for land use coordination and infrastructure delivery through highlighting the provisions that will be required within an Improvement Scheme and Guide Plan. Improvement Plan will need to ensure sufficient guidance is included in order to ensure the development of an Improvement Scheme and Guide plan, which includes the following:

- streamlining of the approval process
- reducing the layer of planning required
- avoiding duplication and inconsistencies in requirements / planning provisions
- ensuring projects of state significance are appropriately considered
- ensuring local planning is not neglected or adversely impacted by development.

To inform an appropriate approach to the development of the Improvement Plan and Scheme for the ANSIA, a thorough understanding of the context, broader influences and provisions of existing documentation that may impact the project is required. This includes key environmental aspects such as flora and vegetation and fauna.

The recommended Improvement Plan boundary is based on the inclusion of the ANSIA Structure Plan area, the future expansion area to the east towards Onslow Road and an appropriate buffer to preserve the integrity of the ANSIA (Figure A).



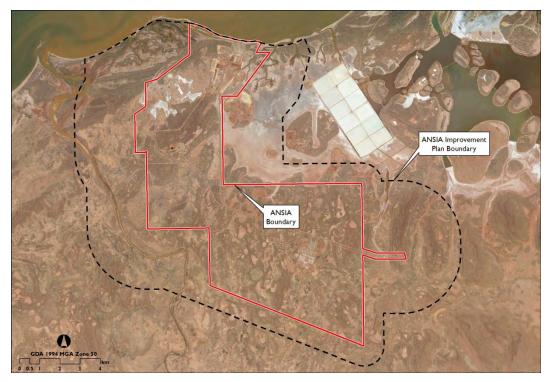


Figure A: Existing ANSIA and Proposed Improvement Plan Boundaries

I.I.I Previous Environmental Approvals

Since 2008, a raft of documentation has been prepared in order to establish and further develop the ANSIA for the purposes of providing a strategic industrial area which is suitable for hydrocarbon processing industries and support facilities, promoting the common use of infrastructure and industrial synergies. The framework has developed incrementally in order to reflect the varying timeframes associated with the establishment of the gas plants. To date the current planning has produced:

- scheme amendments to the Shire of Ashburton Local Planning Scheme 7 to facilitate the rezoning of the land from "Rural" to "Strategic Industrial", "Industrial" and "Special Use" zones
- ANSIA Structure Plan and Stage IB and IC Development Plan which provides the framework for the development of Stage I, including stages
 - Wheatstone LNG Plant and Common User Coastal Area/Port and Multi User Infrastructure Access Corridors, and the Wheatstone Transient Workforce Accommodation, and second Transient Workers Accommodation Site
 - Macedon gas plant and Scarborough gas plant
 - future industrial area
 - general industrial area



 both the Macedon gas pipeline and the Wheatstone LNG plant were subject to a formal environmental assessment.

The above structure plans and development approvals were subject to comprehensive flora and vegetation surveys and environmental reporting.

1.1.2 Industrial Development within the ANSIA

Industrial development proposed within the ANSIA is separated into either Heavy or General Industry land uses. Figure B shows these land uses in the context of the ANSIA.

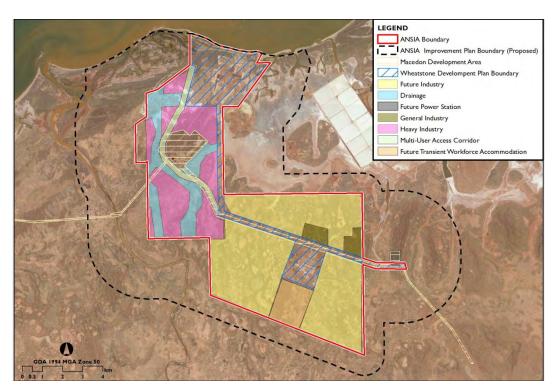


Figure B: Industrial Land Uses within the ANSIA

I.I.2.I Buffers

The overall aim of the Strategic Industrial Area Buffer is to ensure that no sensitive receptors as defined by the State Industrial Buffer Policies are located within proximity to the ANSIA. The external buffers from the industrial land uses have been established with regard to the following planning and environmental criteria:

- Noise at sensitive land uses being 35dB(A)
- Risk at a risk level of one in a million per year or less
- Air Quality.

The ANSIA also accommodates internal buffers from sensitive land uses such as the Temporary Workers Accommodation (TWA). The ANSIA external and internal buffers are depicted in Figure C.



This outcome will deliver "islands" of individual industrial land uses within the ANSIA landscape.

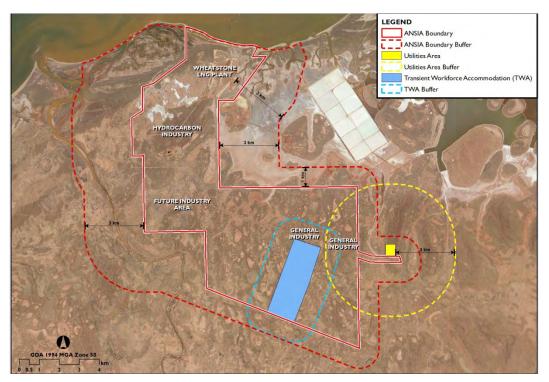


Figure C: ANSIA Internal and External Buffers

1.2 Flora and Vegetation Review

1.2.1 Objectives

The primary objectives of this flora and vegetation literature review are:

- to assess the adequacy of the existing data for the ANSIA Improvement Plan Area in terms of informing potential impacts to flora and vegetation values
- to identify any data gaps to determine the need for further surveys.

1.2.2 Scope of Work

The scope of work addressed by this review involves the following tasks:

- Undertake a review of all environmental literature and reports relevant to the ANSIA Improvement Plan Area, and collate and summarise the historical knowledge of the flora and vegetation.
- Provide a summary of the vegetation communities and flora present within the ANSIA Improvement Plan Area.



- Assess the conservation significance of the ANSIA Improvement Plan Area flora and vegetation.
- Assess the adequacy of the available data in satisfactorily describing the flora and vegetation values of ANSIA Improvement Plan Area.
- Identify knowledge gaps, if any, in the biological information available for the ANSIA Improvement Plan Area.



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2.0 LEGISLATIVE CONTEXT

The principal legislation governing environmental protection in Western Australia is the Wildlife Conservation Act 1950 (WC Act), the Environmental Protection Act 1986 (EP Act) and the Environmental Protection Biodiversity Conservation (EPBC Act) 1999.

Western Australian legislation guiding this assessment includes the WC Act (as amended) as it relates to flora, flora collection and the listing of Threatened Ecological Communities (TECs), and the EP Act (as amended), as it relates to Environmental Impact Assessment requirements for flora and vegetation assessments in Western Australia.

As it specifically applies to flora and vegetation, the Commonwealth EPBC Act may be relevant where TECs, or Threatened Flora species or their critical habitat, are found to be present.

2.1 Wildlife Conservation Act 1950

Under the WC Act, the Minister for the Environment may declare species of flora to be protected if they are considered to be in danger of extinction, rare or otherwise in need of special protection. Schedules I and 2 of the Wildlife Conservation (Rare Flora) Notice under the WC Act, deal with those that are threatened and those that are presumed extinct, respectively.

Species that have not been surveyed adequately, to be listed under Schedule I or 2 are added to the Priority Flora Lists under Priorities I, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora. Species that are adequately known, are rare but not threatened, or they meet criteria for Near Threatened, or have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.

Priority Flora are not specifically covered under current legislation, but their conservation status warrants some protection as under both the WC Act and the EP Act the precautionary and "prevention of extinction" principles apply to the conservation of Priority Flora.

Conservation codes for Threatened and Priority flora are defined in Appendix 1.



2.2 Environment Protection and Biodiversity Conservation Act 1999

Some flora species are afforded additional federal protection under the EPBC Act. In Western Australia the flora species listed as threatened under the EPBC Act are predominantly Threatened Flora (as listed under the WC Act).

Conservation codes for federally listed flora are defined in Appendix 1.

2.3 Environmental Protection Act 1986

The EP Act is the principal legislation that provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment. The EP Act is administered by the Environmental Protection Authority (EPA).

Activities that may affect upon the environment within the jurisdiction of Western Australia are recommended to be referred to the EPA for assessment under the EP Act. Unlike the WC Act or the EPBC Act, the EP Act does not specifically protect individual species. However, the EPA does provide guidance on environmental factors that are assessed under the EP Act.



3.0 METHODOLOGY

3.1 Review of Existing Data

3.1.1 Database Searches

Database searches were conducted to determine a list of conservation significant flora (i.e. those protected under the WC Act and/or the EPBC Act, or considered Priority species by Department of Parks and Wildife (DPaW)), and ecological communities of conservation significance that may occur within the vicinity of the ANSIA Improvement Plan Area. The databases searched and the corresponding search areas are provided in Table I. The results of the database searches are presented in Appendix 2 and discussed in Section 6.2.

Table I: Flora and Ecological Community Databases Searched and Corresponding Search Areas

Database Name	Administering Organisation	Search Area Defined
NatureMap Database	DPaW	Circle search within a 25 km radius of 115°01"05'E; 21°45"06'S
Threatened and Priority Flora Databases (TPFL)	DPaW	Circle search within a 50 km radius of 115°01"05'E; 21°45"06'S
WA Herbarium Database (WAHERB)	DPAW	Circle search within a 50 km radius of 115°01"05'E; 21°45"06'S
Threatened and Priority Flora List	DPAW	Circle search within a 50 km radius of 115°01"05""E; 21°45"06""S
TEC and Priority Ecological Community (PEC) Database	DPAW	Circle search within a 50 km radius of 115°01"05'E; 21°45"06'S
Protected Matters Search Tool	DoE	Circle search within a 25 km radius of 115°01"05'E; 21°45"06'S

3.1.2 Historical Regional Surveys and Mapping

The following regional land surveys and mapping datasets relating to the ANSIA Improvement Plan Area were reviewed to provide a regional context in which to assess flora and vegetation values:

- the Interim Biogeographical Regionalisation of Australia (IBRA) biological subregions within Australia (Environment Australia 2000; Kendrick and Mau 2002)
- Land Systems (Payne et al. 1988)
- Beard Vegetation Mapping (1975).



3.1.3 Previous Flora and Vegetation Assessments

A number of terrestrial flora and vegetation surveys and assessments have been undertaken within and adjacent to the ANSIA Improvement Plan Area in recent years. This report provides a review and summary of the findings of the survey reports. The survey area boundaries for each of these flora and vegetation surveys are presented in Figure 1. The following eight documents were reviewed to inform this Flora and Vegetation Review (Table 2).

Table 2: Summary of Flora and Vegetation Surveys for the ANSIA Improvement Plan Area

Report Name	Author	Level of Survey
A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow	Biota (2010a)	Level 2 quadrat based field survey
Flora and Vegetation Survey – Ashburton North Project	Onshore Environmental Consultants (2008)	Level 2 quadrat based field survey
Flora and Vegetation Survey – Ashburton North Project Area – Stage 2	Onshore Environmental Consultants (2009)	Level 2 quadrat based field survey
Wheatstone Project Flora and Fauna Assessment Addendum	Biota (2010b); Outback Ecology Services (2010)	Level 2 quadrat based field survey
Ashburton North Strategic Industrial Area Flora and Vegetation Assessment	ENV (2012a)	Level 2 quadrat based field survey
BHBP Macedon Gas Development-For a and Vegetation Survey	Astron (2009)	Level 2 quadrat based field survey
Baseline Vegetation and Flora Survey Ashburton North Pipeline Route Option 3	RPS (2009)	Level 2 quadrat based field survey
Ashburton North Strategic Industrial Area Biological Desktop Review	ENV (2012b)	Desktop survey
Desktop Review of the Proposed Onslow Micro-Siting Survey Area	Biota (2013)	Desktop survey



4.0 REGIONAL INFORMATION

4.1 Interim Biogeographical Regionalisation of Australia

The IBRA currently recognises 89 bioregions and 419 biological subregions within Australia. The ANSIA Improvement Plan Area lies within the Cape Range CARI subregion of the Carnarvon region (Environment Australia 2000).

4.1.1 Carnarvon Region (Cape Range Subregion)

The Cape Range CARI subregion is 2,547,911 ha in size and is described by Kendrick and Mau (2002) as:

Cape Range and Giralia dune fields form the northern part of Carnarvon Basin. Rugged tertiary limestone and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats. Acacia shrublands over Triodia on limestone (Acacia stuartii or A. bivenosa) and red dune fields, Triodia hummock grasslands with sparse Eucalyptus trees and shrubs on the Cape Range. Extensive hummock grasslands (Triodia) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves. Beach dunes with Spinifex communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based.

4.2 Land System Mapping

Land system mapping of the rangelands of Western Australia by the Department of Agriculture and Food and Department of Land and Surveys defines a map unit or land system as "an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation". The area was mapped at a scale of 1: 250, 000 and Payne et al. (1988) identified five land systems within the Ashburton River Catchment that coincide with the ANSIA Improvement Plan Area (Table 3) (Figure 2).

Table 3: Land Systems Represented within the ANSIA Improvement Plan Area

Land System	Description	
Dune	Dune fields supporting soft spinifex grasslands.	
Giralia	Linear dunes and broad sandy plains supporting hard and sof spinifex grasslands.	
Littoral	Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches.	
Minderoo	Alluvial plains supporting tall shrublands and tussock grasslands and sandy plains supporting hummock grasslands.	
Onslow	Undulating sandplains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands.	



4.3 Beard (1975) Regional Vegetation Mapping

4.3.1 Bioregion

The vegetation of the ANSIA Improvement Plan Area lies within the Carnarvon Botanical District of the Eremaean Botanical Province of Western Australia. More specifically it is situated in the Cape Yannarie Coastal Plain (CYCP) subdistrict as mapped and described by Beard (1975). Beard described three broad vegetation community types for the CYCP as follows:

- mangroves along the coastline within the intertidal zone, dominated by Avicennia marina and Rhizophora stylosa to a lesser extent
- behind the intertidal zone, there is a belt of bare hyper-saline mud generally devoid of vegetation but with some samphire (*Tecticornia* spp.)
- behind the saline tidal mud flats, there is low country with numerous bare claypans, seasonally filled and interspersed with grass plains (clay soil) and sand ridges (sand) with *Triodia* dominant. On higher ground there are extensive plains with patchy vegetation of *Acacia xiphophylla* (snakewood), *A. tetragonophylla*, *A. bivenosa* and *A. victoriae* (*A. synchronicia*), grassland including *Triodia basedowii* (*T. lanigera*?), claypans and bare patches of gravel.

4.3.2 Vegetation Mapping

Beard (1975) mapped the vegetation of the Pilbara region at a scale of 1:1,000,000. Shepherd, Beetson and Hopkins (2002) used Beard's existing vegetation mapping to produce 1:250,000 scale vegetation association mapping. The ANSIA Improvement Plan Area intersects the following five vegetation associations described by Shepherd, Beetson and Hopkins (2002) (Table 4)(Figure 3).

Table 4: Beard Vegetation Associations Represented within the ANSIA Improvement Plan Area

Assoc. No.	Beard Association Description
117	Hummock grasslands, grass steppe; soft spinifex
124	Steppe
127	Bare areas: mudflats
589	Mosaic: Short bunch grassland – savannah/grass plain (Pilbara)/hummock grasslands, grass steppe; soft spinifex soft spinifex
670	Hummock grasslands, shrub steppe; scattered shrubs over Triodia basedowii.

(Sources: Beard 1975; Shepherd, Beetson and Hopkins 2002)



4.3.3 Reservation Priorities of Vegetation Associations Mapped for the ANSIA Improvement Plan Area

The vegetation associations mapped by Beard (1975) for the ANSIA Improvement Plan Area are widespread in the subregion with 100% of their pre-European extent remaining for four of the five associations represented (there was no available information for Vegetation Association 124). Kendrick and Mau (2002) assessed the reservation priority for these associations on a bioregional level (Table 5).

Table 5: Reservation Status and Priority of Beard Vegetation Associations Represented within the ANSIA Improvement Plan Area

Assoc. No.	Percentage of Pre-European Extent Remaining	IUCN Class I- IV Reserves	Non-IUCN Reserves	DPAW- Purchased Lease	Reservation Priority
117	100%	13.3	1.0	0.0	Medium
124	No Information available	No Information available	No Information available	No Information available	No Information available
127	100%	7.0	4.0	0.0	High
589	100%	1.6	0.0	0.0	High
670	100%	0.0	0.0	1.9	Low

(Sources: Shepherd, Beetson and Hopkins 2002; Kendrick and Mau 2002)

4.4 Conservation Reserves

The Carnarvon IBRA bioregion has only 3.45% represented in conservation reserve (IUCN I-IV). At a subregional level, Cape Range CARI has 2.2% in reserve (Kendrick and Mau 2002). CARI reserves include:

- Cape Range National Park
- Ningaloo Marine Park
- Bundegi Conservation Park
- Jurabi Conservation Park
- Barrow Island Nature Reserve.

There are also numerous small island reserves in the subregion.

The ANSIA Improvement Plan Area does not occur within, or adjacent to, any conservation reserves. Nor does it intersect any Environmentally Sensitive Areas.



4.5 Regional Flora

A total of 1014 flora taxa have been recorded for the Cape Range CARI subregion (FloraBase 2014). Approximately 43% of these belong to five families. The number of taxa for each of these dominant families is presented in Table 6. The numbers in brackets refer to the number of weed species included in each total.

Table 6: Numbers of Taxa of the Five Dominant Plant Families in the Cape Range Subregion

Family	Common Name	No. of Taxa
FABACEAE	Peas	131 (8)
POACEAE	Grasses	97 (7)
ASTERACEAE	Daisies	83 (9)
MALVACEAE	Mallows	70 (2)
CHENOPODIACEAE	Goosefoots	55 (1)

A total of 31 Conservation Significant flora taxa are known from the CAR1 subregion (FloraBase 2014), none of these are listed as Threatened or are protected under the WC Act These comprise four Priority 1; 12 Priority 2; 11 Priority 3; and four Priority 4 taxa (FloraBase 2014).

Fifty-five alien (weed) taxa are known from the CARI subregion (FloraBase 2014). The families with the greatest number of weed species are Asteraceae (nine taxa), Fabaceae (eight taxa), and Poaceae (seven taxa).

According to the Western Australian Organism List (WAOL) (Department of Agriculture and Food Western Australia (DAFWA) 2014), which lists organisms that are declared under the *Biosecurity and Agriculture Management Act 2007*, nine flora species with a status of Declared Pest (s22) are identified within the Shire of Ashburton all belonging to the Control Category C3 – Management. Additionally, the list of Weeds of National Significance names two species occurring within the Shire of Ashburton (Table 7).



Table 7: Declared Pests (Flora Taxa) and Weeds of National Significance for the Shire of Ashburton

Family	Species	Common Name	Declared Pest	Weed of National Significance
PAPAVERACEAE	Argemone ochroleuca Sweet subsp. ochroleuca	Mexican poppy	✓	-
SOLANACEAE	Datura ferox	Fierce thornapple	✓	-
SOLANACEAE	Datura inoxia	-	✓	-
SOLANACEAE	Datura leichhardtii	Native thornapple	✓	-
SOLANACEAE	Datura metel	Downy thornapple	✓	-
SOLANACEAE	Datura stramonium	Common thornapple	✓	-
SOLANACEAE	Datura wrightii	Hairy thornapple	✓	-
LAMIACEAE	Marrubium vulgare	Horehound	✓	-
FABACEAE	Parkinsonia aculeata	Parkinsonia	✓	✓
FABACEAE	Prosopis pallida	Mesquite	-	✓

(Source: DAFWA 2014)



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5.0 RESULTS OF DATABASE SEARCHES

5.1 Threatened and Priority Flora

A search of the Protected Matters Database, DPaW Flora Databases and NatureMap Database revealed that no Threatened Flora taxa are known, or expected, to occur within a 50 km radius of search coordinates 115°01"05'E; 21°45"06'S.

The database searches revealed records of seven conservation significant flora species comprising two Priority I (PI), two Priority 2 (P2) and three Priority 3 (P3) species within a 50 km radius of search coordinates I15°01"05'E; 21°45"06'S. (Table 8). One of these taxa, *Eleocharis papillosa*, is also listed federally as Vulnerable under the EPBC Act. The locations of these records in relation to the ANSIA Improvement Plan Area are shown in Figure 4.

Table 8: Flora Database Search Results for Species Records within a 50 km Radius of 115°01"05'E; 21°45"06'S

Species	Cons. Code (WC Act)	Cons. Code (EPBC Act)
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P1	-
Abutilon sp. Onslow (F. Smith s.n. 10/9/61) PN	P1	-
Carpobrotus sp. Thevenard Island (M. White 050)	P2	-
Vigna sp. central (M.E. Trudgen 1626)	P2	-
Eleocharis papillosa	P3	VU
Eremophila forrestii subsp. viridis	P3	-
Triumfetta echinata	P3	-

These species were assessed in terms of their likelihood of occurring within the ANSIA Improvement Plan Area based on proximity of documented records, and on the presence of suitable habitat within the site (Table 9). Definitions of the conservation codes are presented in Appendix I.

Four of these seven Priority-listed species are known to occur within the ANSIA Improvement Plan Area having been recorded in previous surveys.

Abutilon sp. Pritzelianum (S. van Leeuwen 5095) may occur within the ANSIA Improvement Plan Area; the nearest record is within 10 km of the site, however no habitat information was readily available. Neither Abutilon sp. Onslow (F. Smith s.n. 10/9/61) PN nor Carpobrotus sp. Thevenard Island (M. White 050) are likely to occur within the ANSIA Improvement Plan Area because the site is well outside their documented range.



Table 9: Likelihood of Priority flora Species Identified in the Database Searches Occurring in the ANSIA Improvement Plan Area

Species	Cons. Code	Preferred Habitat (FloraBase 2014)	Suitable Habitat within ANSIA Improvement Plan Area	Closest Record	Likelihood of Occurrence
Abutilon sp. Pritzelianum (S. van Leeuwen 5095)	P1	Not available	Not known	Recorded 10 km from the ANSIA Improvement Plan Area	Possibly
Abutilon sp. Onslow (F. Smith s.n. 10/9/61) PN	P1	Not available	Yes	Recorded < 30 km to the east of the ANSIA Improvement Plan Area	Not likely (outside documented range)
Carpobrotus sp. Thevenard Island (M. White 050)	P2	Coarse white sand. Dune tops, disturbed areas.	No	Recorded on Thevenard Island	Not likely
Vigna sp. central (M.E. Trudgen 1626)	P2	Sandplains, coastal dunes.	Yes	Recorded just outside the northern boundary of the ANSIA Improvement Plan Area	Known to occur in the vicinity
Eleocharis papillosa	P3	Red clay over granite, open clay flats. Claypans	Yes	Recorded within the ANSIA Improvement Plan Area	Known to occur
Eremophila forrestii subsp. viridis	P3	Not available	Yes	Recorded within the ANSIA Improvement Plan Area	Known to occur
Triumfetta echinata	P3	Red sandy soils. Sand dunes	Yes	Recorded on the eastern boundary of the ANSIA Improvement Plan Area	Known to occur

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5.2 Threatened and Priority Ecological Communities

There are two TECs within the Pilbara region endorsed by the Minister of the Environment (DPaW 2014a); 46. Themeda Grasslands: Themeda grasslands on cracking clays (Hamersley Station, Pilbara) and 78. Ethel Gorge: Ethel Gorge aquifer stygobiont community. Neither of these communities occurs near Onslow or is likely to occur within the ANSIA Improvement Plan Area

Additionally, there are 30 PECs listed for the Pilbara region (DPaW 2014b), however none of these correlate to any of the 33 vegetation sub-associations mapped and described for the ANSIA Improvement Plan Area to date (Biota 2010a).



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6.0 RESULTS OF PREVIOUS SURVEYS

6.1 Flora Statistics

A total of 433 native taxa and 13 exotic (weed) taxa have been recorded from the surveys undertaken for the ANSIA to date. These taxa represent 167 genera from 58 families. This total represents an amalgamation of the numbers recorded for each survey (Table 12). The numbers in brackets represent the number of taxa recorded for that survey that were not recorded for any of the other studies. The floristic data from the surveys undertaken by OEC (2008; 2009), Astron (2009), RPS (2009), Biota (2010a), Biota (2010b) and ENV (2012a) was compiled to create the final flora inventory of 446 species (Appendix 3). This total of 446 native and weed taxa recorded for the ANSIA to date represents 44% of the total number of 1,014 flora taxa recorded for the Cape Range CARI subregion (FloraBase 2014).

The families and genera with the greatest number of species are presented in Table 10 and Table 11. The numbers in brackets refer to the number of weed species included in each total.

Table 10: Dominant Families within the ANSIA Improvement Plan Area

Family	Common Name	No. of Taxa	Proportion of Total Taxa in CAR1 Subregion (%)
FABACEAE	Peas	80 (4)	59
POACEAE	Grasses	71 (3)	70
CHENOPODIACEAE	Goosefoots	46 (0)	78
ASTERACEAE	Daisies	29 (1)	35
MALVACEAE	Mallows	30 (1)	39

Table II: Dominant Genera within the ANSIA Improvement Plan Area

Genus	Common name	No. of Taxa
Acacia	Wattle	23
Tecticornia	Samphire	18
Ptilotus	Mulla mulla	14
Abutilon	Lantern bush	11
Senna	-	11
Euphorbia	-	12



Table 12: Statistics for the Flora and Vegetation Surveys Undertaken for the ANSIA Improvement Plan Area

Report Name	Level of Survey	Survey Area (ha)	No. of Quadrats Sampled (within ANSIA)	No. of Native Taxa	No. of Weed Taxa	Vegetation Sub- associations
A Vegetation and Flora Survey of the Wheatstone Study Area, near Onslow (Biota 2010a)	Level 2 quadrat based field survey	9,700	280	338	12	33
Flora and Vegetation Survey – Ashburton North Project (Onshore Environmental Consultants 2008)	Level 2 quadrat based field survey	460		232 (51*)	7	
Flora and Vegetation Survey – Ashburton North Project Area – Stage 2 (Onshore Environmental Consultants 2009)	Level 2 quadrat based field survey	2,200				
Wheatstone Project Flora and Fauna Assessment Addendum (Biota 2010b; Outback Ecology Services 2010)	Level 2 quadrat based field survey	3,400		80	6	
Ashburton North Strategic Industrial Area Flora and Vegetation Review (ENV 2012a)	Level 2 quadrat based field survey	564	22	131 (19*)	6	N/A
BHBP Macedon Gas Development-For a and Vegetation Survey (Astron 2009)	Level 2 quadrat based field survey	1,200	16	105 (19*)	6	NA
Baseline Vegetation and Flora Survey Ashburton North Pipeline Route Option 3 (RPS 2009)	Level 2 quadrat based field survey	1,000	4	66 (3*)	2	NA
Ashburton North Strategic Industrial Area Biological Desktop Review (ENV 2012b)	Desktop survey	564	NA	NA	NA	NA
Desktop Review of the Proposed Onslow Micro-Siting Survey Area (Biota 2013)	Desktop survey	1,669	NA	NA	NA	NA
Total			322	433	13	33

^{*} The numbers in brackets represent the number of taxa recorded for that survey that were not recorded for any of the other studies

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6.2 Conservation Significant Flora

6.2.1 Threatened Flora (EPBC Act) Listed for the ANSIA Improvement Plan Area

One taxon, *Eleocharis papillosa*, listed federally as Vulnerable under the EPBC Act, was recorded from the ANSIA Improvement Plan Area during surveys in 2009 (Biota 2010a). No other species listed under the EPBC Act have been previously recorded from the site, the locality, or are expected to occur in the habitats within the ANSIA Improvement Plan Area.

6.2.2 Threatened Flora (WC Act) Listed for the ANSIA Improvement Plan Area

No species listed as Threatened Flora by DPaW and protected under the Western Australian WC Act were recorded from the ANSIA Improvement Plan Area, or from the 50 km database search area. No Threatened Flora species are expected to occur in the habitats within the site.

6.2.3 Priority Flora Listed for the ANSIA Improvement Plan Area

Four Priority species have been recorded from the ANSIA Improvement Plan Area to date (Biota 2010a): *Eleocharis papillosa, Eremophila forrestii* subsp. *viridis, Triumfetta echinata*, and *Atriplex flabelliformis* Paul G. Wilson. A description of these species follows. Priority Flora locations recorded in previous surveys within the ANSIA Improvement Plan Area are presented in Figure 6.

6.2.3.1 <u>Eleocharis papillosa – Priority 3 (WC Act), Vulnerable (EPBC Act)</u>

Small annual sedge, this species is not considered Critically Endangered or Endangered but is Vulnerable because it is facing a high risk of extinction in the wild in the medium-term future. The species was assigned P3 status by DPaW as its consideration for Threatened status was probably overlooked (Biota 2010a).

E. papillosa was recorded from one location in Vegetation of Claypans vegetation sub-association *TEC*spp. The species was considered by Biota (2010a) to be likely to occur throughout this habitat type and may be more widespread. It is known to grow on red clay over granite, open clay flats and claypans (FloraBase 2014).

6.2.3.2 <u>Eremophila forrestii subsp. viridis – Priority 3 (WC Act)</u>

A perennial shrub to one metre (FloraBase 2014), *E. forrestii* subsp. *viridis* is probably restricted to the Onslow locality despite FloraBase showing records further afield; these have probably been misidentified (Biota 2010a).



E. forrestii subsp. viridis was recorded from three locations in the ANSIA Improvement Plan Area (Biota 2010a) within the Vegetation of Inland Sand Dunes vegetation sub-associations GsCRcTRzTe and GsCRcHBbTsTe. The species has also been recorded at other locations near the ANSIA Improvement Plan Area and wider Onslow locality (OEC 2008; Astron 2009; ENV 2012a; Biota unpublished data).

6.2.3.3 <u>Triumfetta echinata – Priority 3 (WC Act)</u>

A prostrate shrub to 0.3 metres occurring on red sandy soils and sand dunes (FloraBase 2014), *T. echinata* occurs primarily in the Onslow area although there is an outlier population approximately 120 km south in the Gascoyne bioregion.

T. echinata was recorded from numerous (> 30) locations within and adjacent to the ANSIA Improvement Plan Area (OEC 2008; OEC 2009; Biota 2010a; RPS 2009) within the Vegetation of Inland Sand Dunes vegetation sub-associations GsCRcTRzTe and GsCRcHBbTsTe.

The species has also been recorded at other locations near the ANSIA Improvement Plan Area and wider Onslow locality and it appears to be widespread in the locality however; it is relatively rare and restricted to red sand dunes (Biota 2010a).

6.2.3.4 Atriplex flabelliformis Paul G. Wilson – Priority 3 (WC Act)

A monoecious perennial herb to 0.35 metres occurring on clay loam, loam and saline flats or marshes (FloraBase 2014). A. flabelliformis was recorded from five locations within the ANSIA Improvement Plan Area in Vegetation of Claypans and Clayey Plains vegetation sub-associations TECspp and SPmERIbEUa.

6.3 Vegetation

An amalgamation of survey data from Biota (2010a), Onshore Environmental Consultants (2008), Onshore Environmental Consultants (2009), and Biota (2010b); Outback Ecology Services (2010) resulted in the delineation and description of 33 vegetation sub-associations over the ANSIA Improvement Plan Area. Figure I shows the survey boundaries for each of the studies undertaken and shows how these survey areas intersect with the ANSIA Improvement Plan Area.

The Astron (2009) study mapped and described 39 vegetation sub-associations; however, these were mapped along a corridor approximately 80 km long, which traversed landforms and vegetation types not represented within the ANSIA Improvement Plan Area. Similarly, the RPS (2009) survey was linear in nature and traversed vegetation not recorded within the ANSIA Improvement Plan Area. For this reason, this review focusses on the vegetation mapping and descriptions compiled by Biota (2010a; 2010b) as it relates directly to the ANSIA Improvement Plan Area.



Mapping of these 33 vegetation sub-associations and a brief description of each is presented in Figure 5.

6.3.1 Conservation Significance of the Vegetation within the ANSIA Improvement Plan Area

The two TECs and 30 PECs known from the Pilbara region do not occur within the ANSIA Improvement Plan Area or the vicinity.

The vegetation of the 33 sub-associations was assessed by Biota (2010a) for conservation significance and was ranked in order of conservation priority. Their assessment focussed on three factors:

- the Land System to which the vegetation sub-association belongs, and its level of representation within the region
- the capacity for the vegetation sub-association to support conservation significant flora
- the reservation priority of the ecosystems as identified by Kendrick and Mau (2002).

This assessment identified three vegetation sub-associations within Biota's project area of High conservation significance, and two of Moderate conservation significance. The remaining 28 sub-associations were considered by Biota (2010a; 2010b) to be of Low conservation significance as they were representative of the locality. Only four of these five sub-associations lie within the ANSIA Improvement Plan Area (Table 13).

Table 13: Vegetation Sub-associations of Conservation Significance

Vegetation Sub-association	Description	Rank	Reason
Vegetation of Inland S	Sand Dune		
GsCRcTRzTe	Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Trichodesma zeylanicum var. grandiflorum open shrubland over Triodia epactia open hummock grassland	Н	Supports Priority taxa Eremophila forrestii subsp. viridis (P3) and Triumfetta echinata (P3) Susceptible to erosion and weed invasion
GsCRcHBbTsTe	Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Hibiscus brachychlaenus open shrubland over Triodia shhinzii (Triodia epactia) open hummock grassland	Н	Supports Priority taxa Eremophila forrestii subsp. viridis (P3) and Triumfetta echinata (P3) Susceptible to erosion and weed invasion



Vegetation Sub-association	Description	Rank	Reason
Vegetation of Claypan	s		
<i>TEC</i> spp	Tecticornia spp. Low shrubland	Н	Supports Priority taxon Eleocharis papillosa (P3/Vulnerable)
Cracking Clay Grasslands			
SPmERlbEUa	Sporobolus mitchellii, Eriachne aff. Benthamii, Eriachne benthamii, Eulalia aurea tussock grassland	М	Supports Priority taxon Atriplex flabelliformis (P3). Generally in very Good condition

(Source: Biota 2010a)



7.0 DISCUSSION

The key considerations relating to flora and vegetation of the ANSIA Improvement Plan Area are discussed below.

7.1 Flora

7.1.1 Regional Representation

The 435 flora taxa recorded for the ANSIA represent 43% of the total flora taxa recorded for the entire Cape Range CARI subregion (FloraBase 2014). The studies conducted over the ANSIA Improvement Plan Area in recent years therefore constitute a relatively intensive survey effort in what is regarded a poorly surveyed sub-region, with only small areas having undergone detailed investigation by botanists (Kendrick and Mau 2002). The three dominant plant families recorded for the ANSIA Improvement Plan Area; Fabaceae (Peas), Poaceae (Grasses), and Chenopodiaceae (Goosefoots or Samphires); represented an even greater proportion of the subregional totals with 59% of Fabaceae, 70% of Poaceae and 78% of Chenopodiaceae known from the sub-region recorded within the ANSIA Improvement Plan Area.

7.1.2 Conservation Significance of the Flora

Four conservation significant flora species were collectively recorded from the surveys undertaken for the ANSIA Improvement Plan Area: *Eleocharis papillosa* (P3), *Eremophila forrestii* subsp. *viridis* (P3), *Triumfetta echinata* (P3), and *Atriplex flabelliformis* (P3). These species were associated with particular vegetation associations and landforms (Table 14). Figure 6 shows Priority Flora records coinciding with the crests and ridges of inland sand dunes.

Table 14: Priority Species and Associated Vegetation and Landform

Priority Taxon	Vegetation sub-association	Landform
Eleocharis papillosa (P3)	Samphire shrublands vegetation subassociation <i>TEC</i> spp.	Dune crest
Eremophila forrestii subsp. viridis (P3)	Inland sand dune vegetation sub- association GsCRcTRzTe	Dune crest
Triumfetta echinata (P3)	Inland sand dune vegetation sub- association GsCRcHBbTsTe	Dune crest
Atriplex flabelliformis (P3)	Claypan vegetation sub-association TECspp and Clayey Plain vegetation sub-association SPmERLbEUa	Claypan and plains



7.2 Vegetation

7.2.1 Regional Representation

Although Kendrick and Mau (2002) identified several areas within the CARI sub-region as having known special values relating to landscape, ecosystem and species, relating particularly to areas of high biodiversity and/or endemism or refugia, the area within which the ANSIA Improvement Plan Area occurs was not one. These recognised areas predominantly consisted of the numerous small islands off the Pilbara coast, the Karst System of Cape Range, the Bundera Sinkhole, Mangroves of eastern Exmouth Gulf and Ningaloo Reef. None of the ecosystems represented within the ANSIA Improvement Plan Area were considered by Kendrick and Mau (2002) to be "Ecosystems at Risk".

The five Beard (1975) vegetation associations represented within the ANSIA Improvement Plan Area are widespread in the subregion with 100% of their pre-European extent remaining. Kendrick and Mau (2002) identified two of the associations (127 and 589) as being of High reservation priority because they are underrepresented in reserves within the sub-region:

- vegetation association 127 Bare areas: mudflats intersects with a small northeastern portion of the ANSIA Improvement Plan Area (Figure 3)
- vegetation association 589 Mosaic: Short bunch grassland savannah/grass plain (Pilbara)/Hummock grasslands, grass steppe; soft spinifex soft spinifex covers between 20% and 30% of the ANSIA Improvement Plan Area (Figure 3).

The remaining vegetation associations (117, 124 and 127) have been listed as having Medium to Low reservation priority, as they are adequately represented in the Cane River Conservation Park.

7.2.2 Conservation Significance of the Vegetation Sub-associations

In A Vegetation and Flora Survey of the Wheatstone Project Area, near Onslow and Vegetation of the Wheatstone Addendum Area Biota (2010a; 2010b) identified three vegetation sub-associations of High conservation priority and one vegetation sub-association of Medium conservation priority (Table 13), due to their susceptibility to erosion and/or weed invasion, and provision of habitat to Priority Flora species. These consisted of two inland sand dune units, one claypan unit and one clayey plain unit.

7.2.2.1 <u>Vegetation of Inland Sand Dunes</u>

GsCRcTRzTe – Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Trichodesma zeylanicum var. grandiflorum open shrubland over Triodia epactia open hummock grassland.



GsCRcHBbTsTe – Grevillea stenobotrya tall open shrubland over Crotalaria Cunninghamii, Hibiscus brachychlaenus open shrubland over Triodia shhinzii (Triodia epactia) open hummock grassland.

7.2.2.2 <u>Vegetation of Claypans</u>

TECspp - Tecticornia spp. Low shrubland

Biota (2010a) assessed the remainder of the vegetation sub-associations as Low conservation significance.

7.2.2.3 <u>Vegetation of Clayey Plains</u>

SPmERIbEUa – Sporobolus mitchellii, Eriachne aff. Benthamii, Eriachne benthamii, Eulalia aurea tussock grassland.

7.3 Survey Effort / Adequacy of the Representative Data

The combined studies conducted over the ANSIA Improvement Plan Area in recent years constitute a relatively intensive survey effort in a generally poorly surveyed subregion. This is evident in the total number of taxa recorded for the area as a percentage of the total taxa known for the sub-region (44%). Survey statistics (Table 12) show that Biota (2010a) surveyed 9,700 ha for which 350 flora taxa were recorded. Onshore Environmental Consultants (2008; 2009) surveyed 2,660 ha and only recorded an additional 51 (previously unrecorded) species. Biota (2010b) surveyed 3,400 ha and recorded 24 species not recorded in previous studies, Astron's (2009) survey of 1,200 ha recorded 19 species not recorded in any other study, ENV (2012a) surveyed 564 ha and recorded 19 species not recorded for any other survey, and the survey of an additional 1,000 ha by RPS (2009) only recorded three species not recorded in any other study.

The species area curve for the sampling effort is shown in Figure D. It illustrates that the actual number of flora taxa recorded for the ANSIA Improvement Plan Area is approaching the theoretical maximum; it is therefore unlikely that further survey work over the unsurveyed portions of the ANSIA Improvement Plan Area would result in a significant increase in number of taxa recorded.



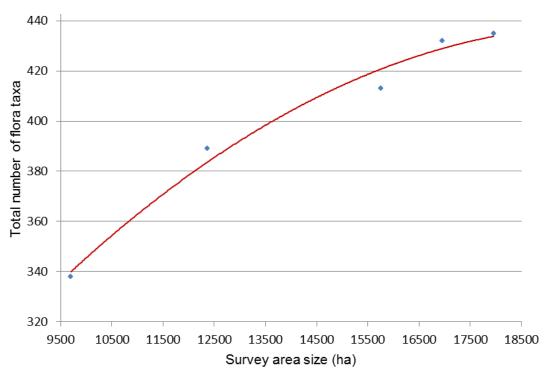


Figure D: Species Area Curve for Combined Flora Surveys

The extensive survey work that has been undertaken over the ANSIA Improvement Plan Area has allowed the vegetation to be mapped with a high level of confidence (Biota 2013). Vegetation mapping of areas that have not been field surveyed can be extrapolated reasonably confidently using a combination of the existing sub-association mapping within the ANSIA Improvement Plan Area, aerial imagery and topographic mapping.

Conservation significant flora searches undertaken as part of previous surveys have provided a good understanding of the vegetation types within the ANSIA Improvement Plan Area that are likely to provide habitat for Priority Flora, therefore mapping the remainder of the proposed ANSIA Improvement Plan Area should assist in identifying additional areas where Priority flora may occur.



8.0 CONCLUSION

The primary objective of this review is to determine if the data from previous flora and vegetation surveys is sufficient to assess adequately the flora and vegetation values of the ANSIA Improvement Plan Area and therefore the potential impacts the future development may pose to the resident flora and vegetation values.

The previous flora survey work, that is the subject of this review, constitutes a substantial survey effort and has resulted in the comprehensive sampling of a large proportion of the ANSIA Improvement Plan Area. None of the studies identified Threatened flora species or TECs / PECs within the target area. The studies have, to date, recorded 446 flora taxa and mapped 33 vegetation sub-associations within the ANSIA Improvement Plan Area, which represents 44% of the total taxa known for the sub-region. It is considered unlikely that additional surveys would result in a significant increase in either the number of taxa recorded, or the mapping of additional vegetation types.

The available dataset is considered adequate to comprehensively describe the flora and vegetation values of the proposed ANSIA Improvement Plan Area and could reliably be used to map potential habitat, and therefore predict additional populations of conservation significant flora taxa throughout areas of the ANSIA Improvement Plan Area that were not the subject of a field survey.



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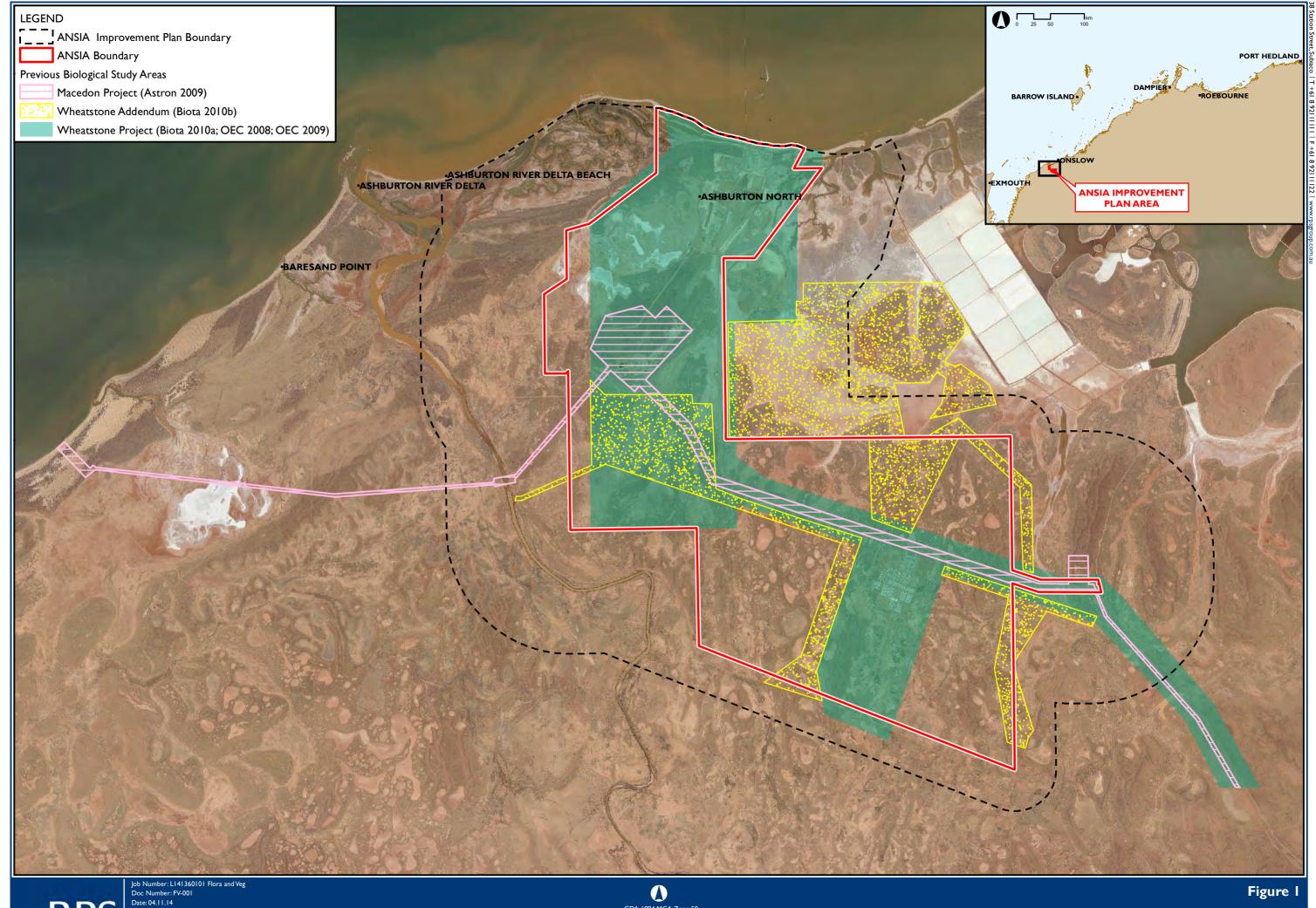
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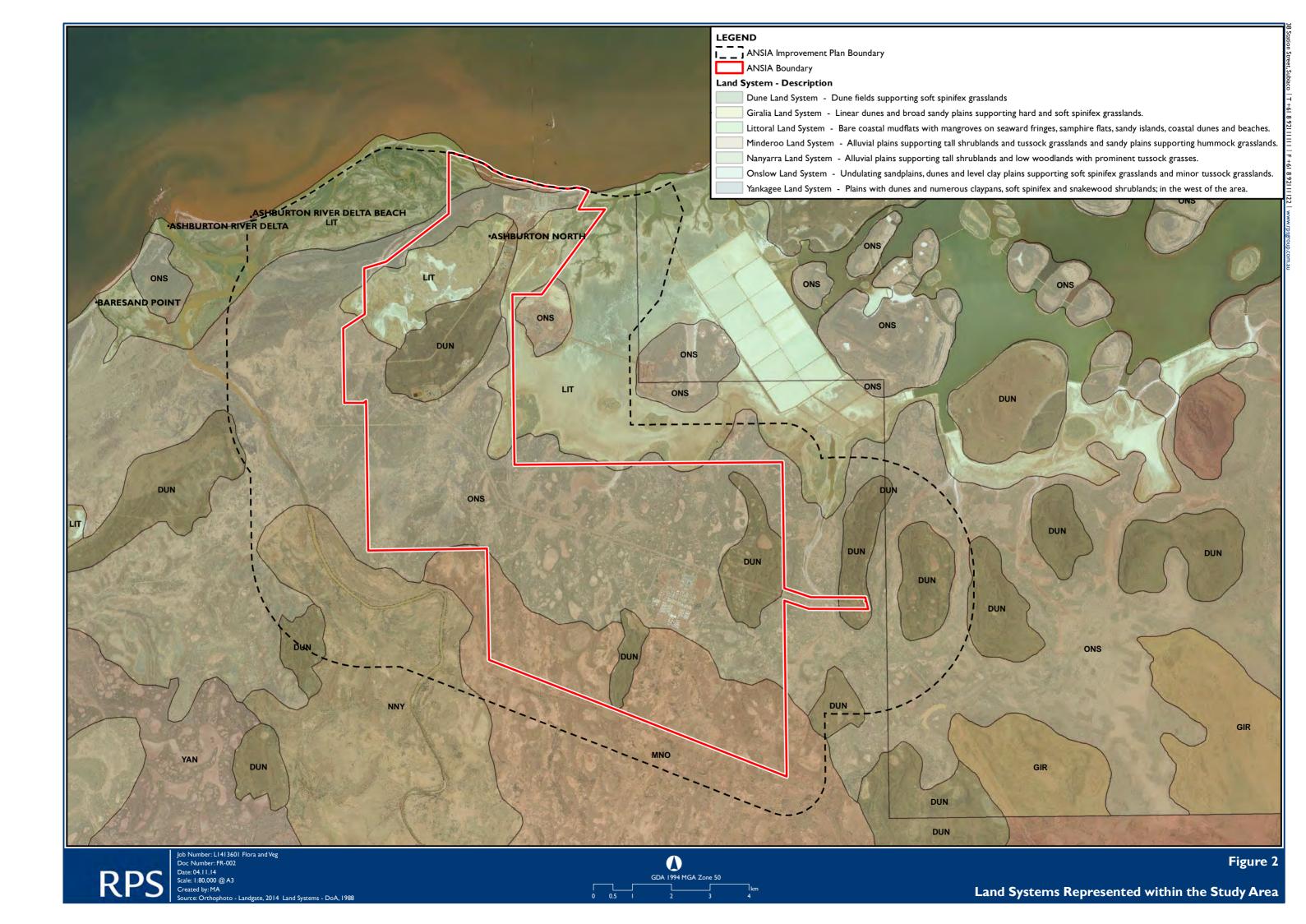


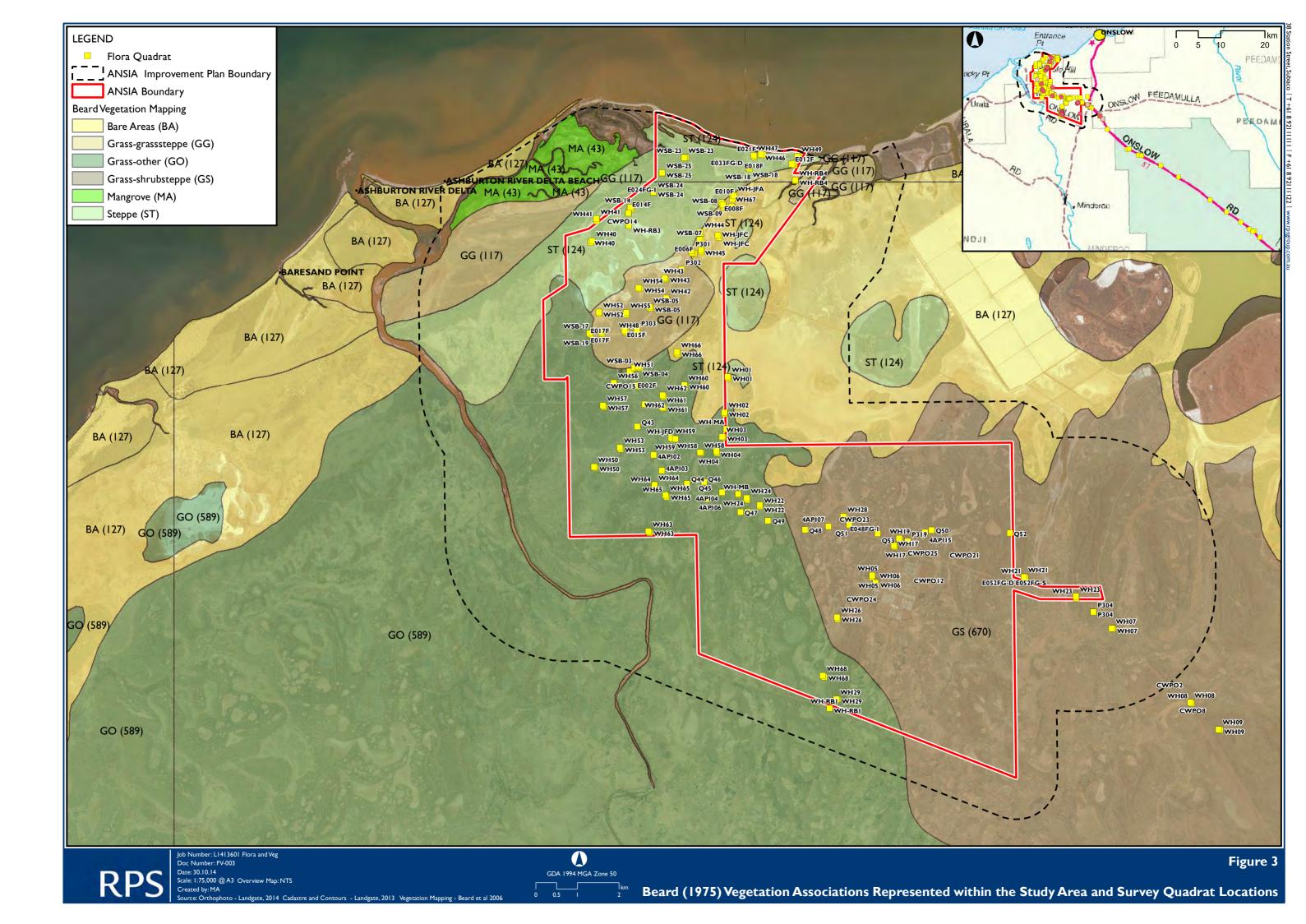
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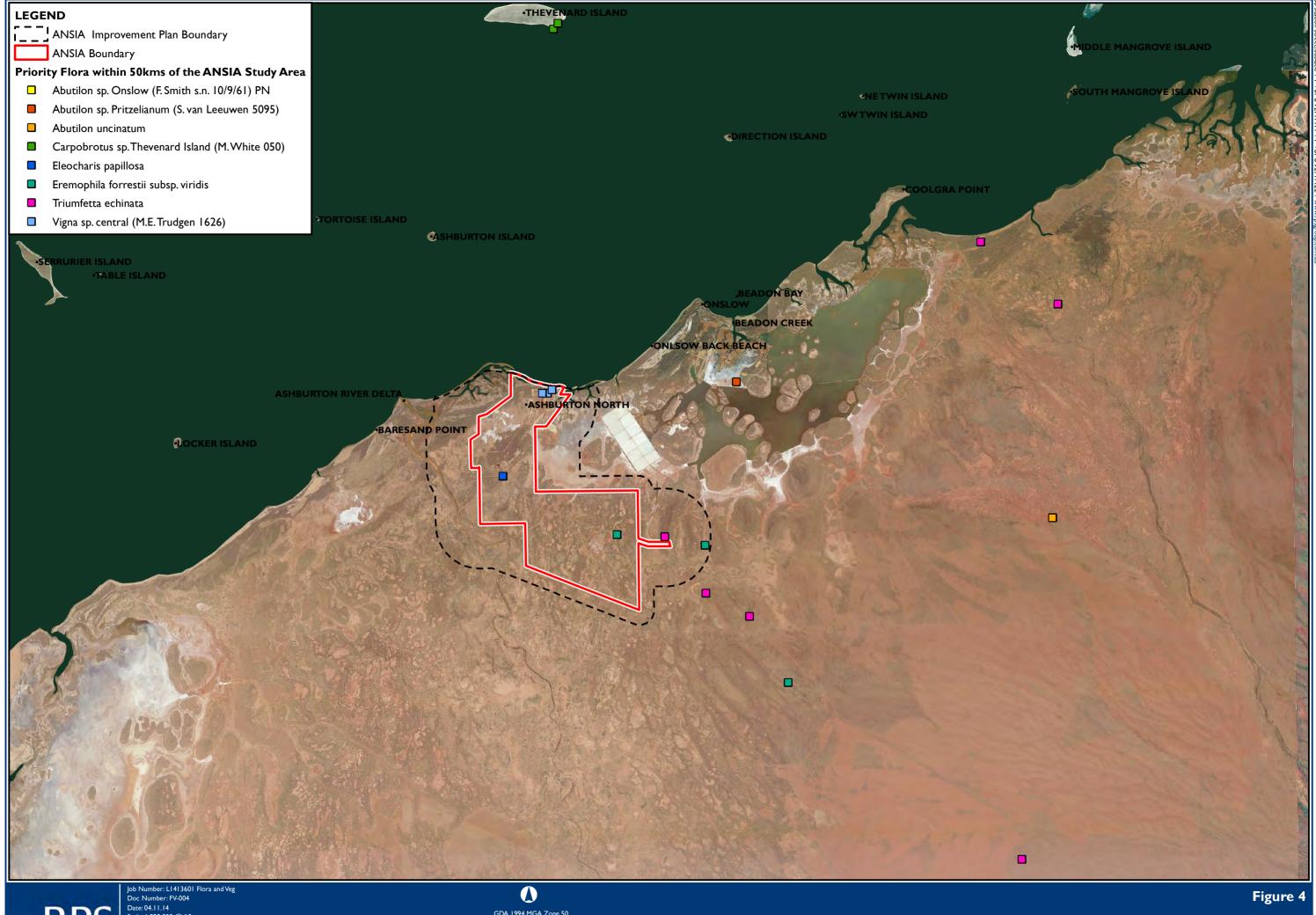


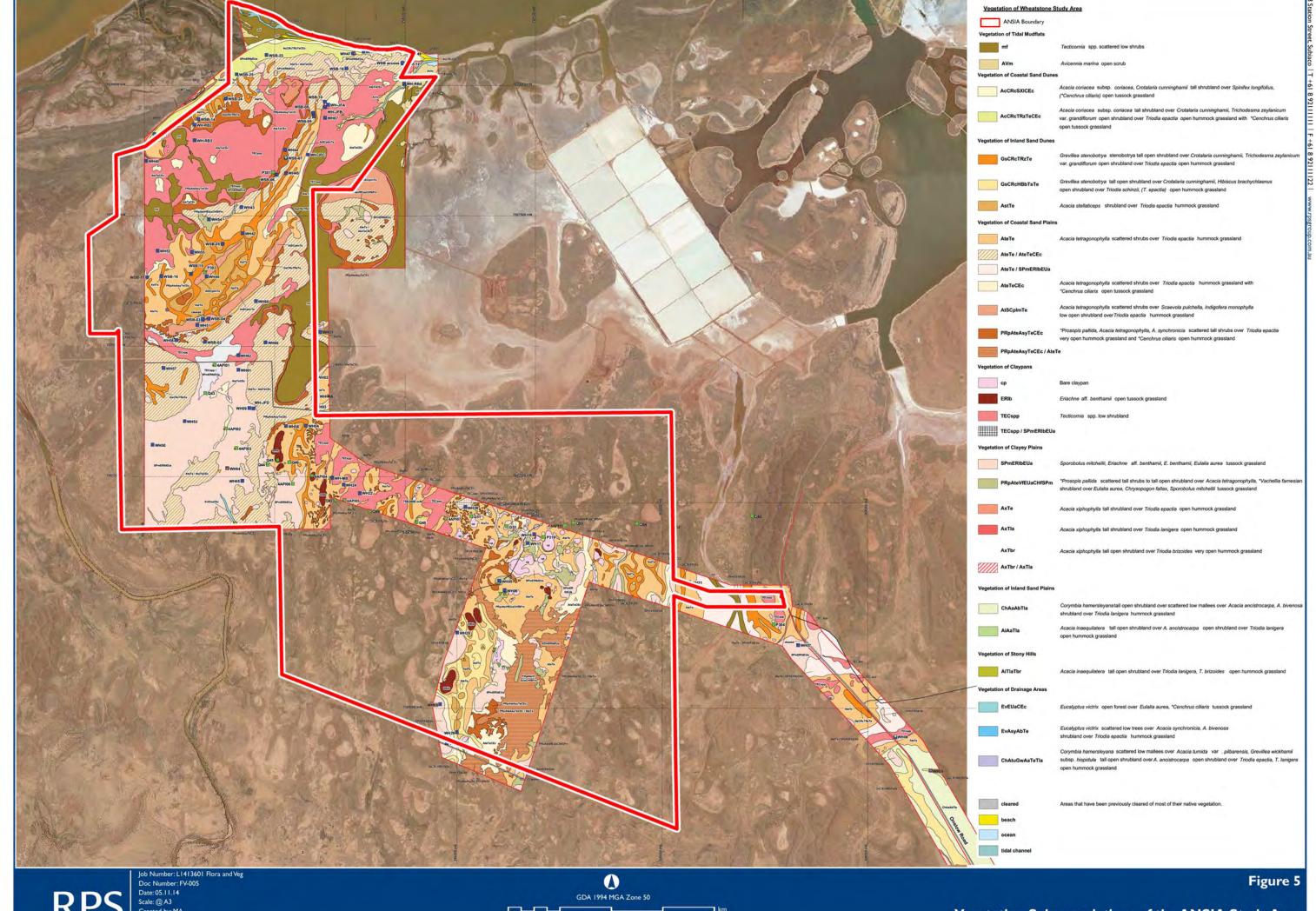
FIGURES

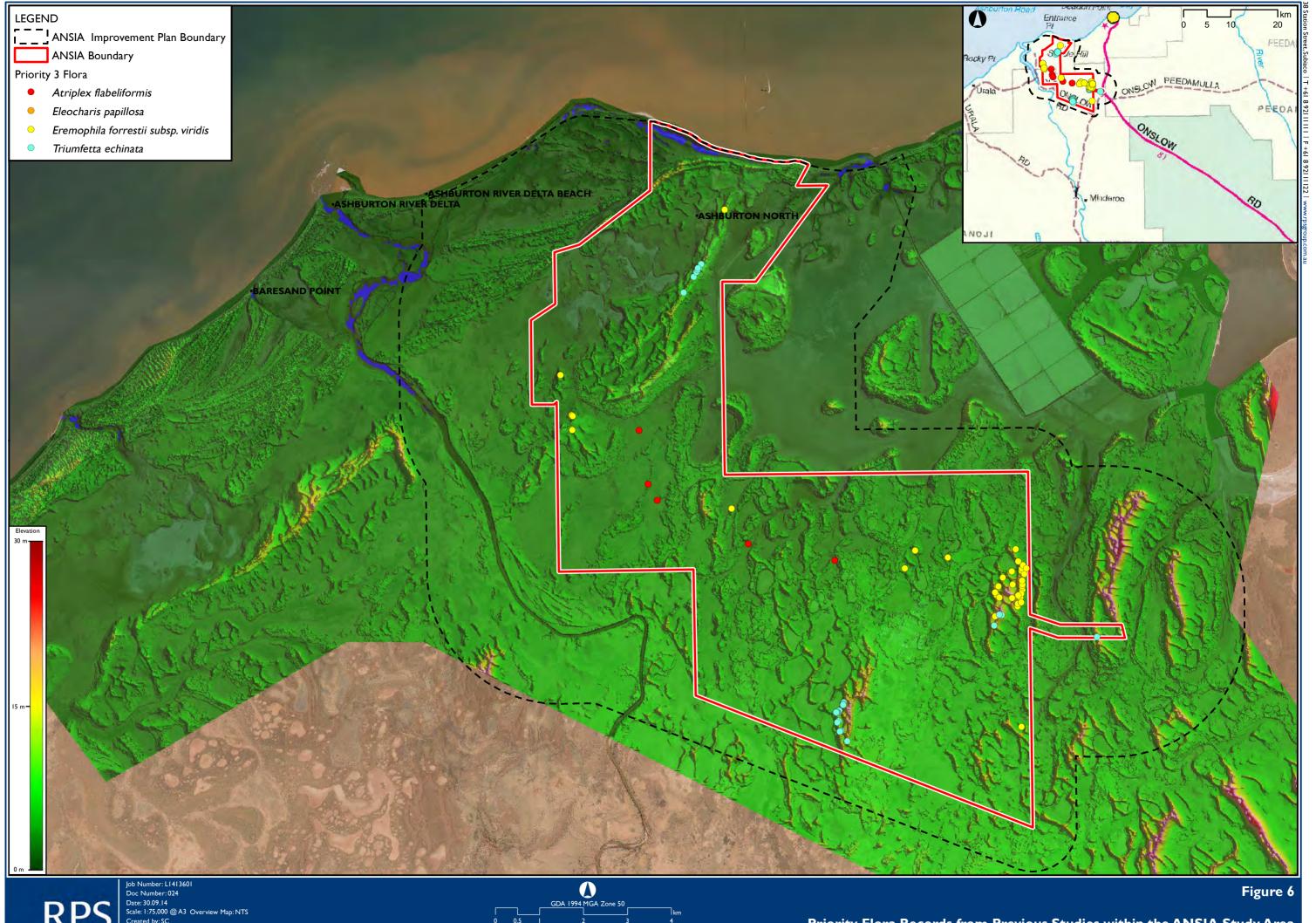














APPENDIX I

Priority Codes and Categories of Threatened Species



APPENDIX I: Conservation Codes

Table 1.1: Conservation Codes for Western Australian Flora (FloraBase 2014)

Category	Definition
Т	Threatened Flora (Extant)
	Taxa that have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such (Schedule 1 of the Wildlife Conservation (Rare Flora) Notice under the Wildlife Conservation Act 1950). Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN
	Red List criteria:
	 CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild
	EN: Endangered – considered to be facing a very high risk of extinction in the wild
	 VU: Vulnerable – considered to be facing a high risk of extinction in the wild.
Χ	Presumed Extinct Flora
	Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such (Schedule 2 of the Wildlife Conservation (Rare Flora) Notice under the <i>Wildlife Conservation Act 1950</i>).
P1	Priority One: Poorly-known Taxa
	Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.
P2	Priority Two: Poorly-known Taxa
	Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, state forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.
P3	Priority Three: Poorly-known Taxa
	Taxa that are known from collections, or sight records from several localities not under imminent threat, or from few but widespread localities, with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.
P4	Priority Four: Rare, Near Threatened and Other Taxa in Need of Monitoring
	Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
	 Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
	 Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.
P5	Priority Five: Conservation Dependent Taxa
	Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.



Table 1.2: EPBC Act Conservation Categories (IUCNRedList 2014).

Category	Definition
	Extinct A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual) throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
	Extinct in the Wild A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalised population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual) throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.
	Critically Endangered A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see Section V), and it is therefore considered to be facing an extremely high risk of extinction in the wild.
	Endangered A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see Section V), and it is therefore considered to be facing a very high risk of extinction in the wild.
	Vulnerable A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see Section V), and it is therefore considered to be facing a high risk of extinction in the wild.
	Near Threatened A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
	Least Concern A taxon is Least Concern when it has been evaluated against the criteria and it does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
	Data Deficient A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases, great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period has elapsed since the last record of the taxon, threatened status may well be justified.
	Not Evaluated A taxon is Not Evaluated when it has not yet been evaluated against the criteria.



APPENDIX 2

Results of Database Searches



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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

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Summary

Details

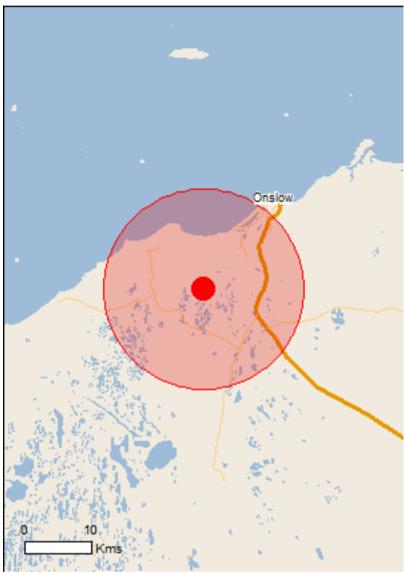
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Other Matters Protected by the EPBC Act

Extra Information

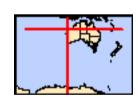
Caveat

<u>Acknowledgements</u>



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

Coordinates
Buffer: 15.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	16
Listed Migratory Species:	26

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 and the heritage values of a place on the Register of the National Estate.

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.

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	57
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

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

Place on the RNE:	2
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds	Ciaids	Type of Trescrice
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
<u>Dasyurus hallucatus</u>		
Northern Quoli [331]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis		
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus angusticeps		
Airlie Island Ctenotus [25937]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population) Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species * Species is listed under a different scientific name of	n the FPRC Act - Threa	[Resource Information
Name	Threatened	Type of Presence
Migratory Marine Birds <u>Apus pacificus</u>		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur
Migratory Marine Species		within area
Balaenoptera edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28] Eretmochelys imbrigata		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Eubalaena australis		•
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Manta birostris		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995] Megaptera novaeangliae		Species or species habitat known to occur within area
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to
		occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding 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
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica		
Barn Swallow [662]		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within
Migratory Wetlands Species		area
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		
Charadrius varadus		Species or species habitat likely to occur within area
Charadrius veredus Oriental Player, Oriental Detterol (882)		Species or species
Oriental Plover, Oriental Dotterel [882]		Species or species habitat may occur within area
Glareola maldivarum Oriental Pratincole [840]		Species or species
Oriental Pratincole [840]		Species or species habitat may occur within area

Other Matters Protected by the EPBC Act

[Resource Information] Commonwealth Land

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 -

[Resource Information] **Listed Marine Species**

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

Type of Presence Name Threatened

Birds

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 likely to occur

within area

Charadrius veredus

Oriental Plover, Oriental Dotterel [882] Species or species

habitat may occur within

area

Glareola maldivarum

Oriental Pratincole [840] Species or species

habitat may occur within

area

<u>Haliaeetus leucogaster</u>

White-bellied Sea-Eagle [943] Species or species

habitat known to occur

within area

Hirundo rustica

Barn Swallow [662] Species or species

habitat may occur within

area

Macronectes giganteus

Southern Giant-Petrel [1060] Species or species Endangered

habitat may occur within

Merops ornatus

Rainbow Bee-eater [670] Species or species

habitat may occur within

area

Pandion haliaetus

Osprey [952] Breeding known to occur

within area

Sterna bengalensis

Lesser Crested Tern [815] Breeding known to occur

within area

Fish

Bulbonaricus brauni

Braun's Pughead Pipefish, Pug-headed Pipefish Species or species habitat may occur within [66189]

area

Campichthys tricarinatus

Three-keel Pipefish [66192] Species or species

habitat may occur within

area

Choeroichthys brachysoma

Pacific Short-bodied Pipefish, Short-bodied Species or species

habitat may occur within Pipefish [66194]

area

Choeroichthys suillus

Pig-snouted Pipefish [66198] Species or species

Name	Threatened	Type of Presence
		habitat may occur within
		area
<u>Doryrhamphus janssi</u>		
Cleaner Pipefish, Janss' Pipefish [66212]		Species or species
		habitat may occur within area
Doryrhamphus negrosensis		arca
Flagtail Pipefish, Masthead Island Pipefish		Species or species
[66213]		habitat may occur within
		area
Festucalex scalaris		Charles ar anasias
Ladder Pipefish [66216]		Species or species habitat may occur within
		area
Filicampus tigris		
Tiger Pipefish [66217]		Species or species
		habitat may occur within
Halicampus brocki		area
Brock's Pipefish [66219]		Species or species
		habitat may occur within
		area
Halicampus grayi		
Mud Pipefish, Gray's Pipefish [66221]		Species or species
		habitat may occur within area
Halicampus nitidus		alca
Glittering Pipefish [66224]		Species or species
		habitat may occur within
Ella Para como caracter (con a fota		area
Halicampus spinirostris Spiny spout Dipofich [66225]		Species or appoins
Spiny-snout Pipefish [66225]		Species or species habitat may occur within
		area
Haliichthys taeniophorus		
Ribboned Pipehorse, Ribboned Seadragon		Species or species
[66226]		habitat may occur within
Hippichthys penicillus		area
Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species
		habitat may occur within
		area
Hippocampus angustus Western China Cocherne Norman hellied Cocherne		Consiss or opening
Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within
[00204]		area
<u>Hippocampus histrix</u>		
Spiny Seahorse, Thorny Seahorse [66236]		Species or species
		habitat may occur within
<u>Hippocampus kuda</u>		area
Spotted Seahorse, Yellow Seahorse [66237]		Species or species
		habitat may occur within
		area
Hippocampus planifrons		0
Flat-face Seahorse [66238]		Species or species habitat may occur within
		area
Micrognathus micronotopterus		
Tidepool Pipefish [66255]		Species or species
		habitat may occur within
Solegnathus hardwickii		area
Solegnathus hardwickii Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species
1 ama 1 iponorso, Harawiok s 1 iponorse [002/2]		habitat may occur within
		area
Solegnathus lettiensis		
Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species
		habitat may occur within area
Solenostomus cyanopterus		aroa
Robust Ghostpipefish, Blue-finned Ghost Pipefish,		Species or species
[66183]		habitat may occur within

Name	Threatened	Type of Presence
		area
Solonostomus paognius		
Solenostomus paegnius		
Rough-snout Ghost Pipefish [68425]		Species or species
		habitat may occur within
		area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse,		Species or species
·		•
Alligator Pipefish [66279]		habitat may occur within
		area
<u>Trachyrhamphus bicoarctatus</u>		
Bentstick Pipefish, Bend Stick Pipefish, Short-		Species or species
tailed Pipefish [66280]		habitat may occur within
tanda i iponori [00200]		area
Trochurhomphus longirostria		alea
<u>Trachyrhamphus longirostris</u>		
Straightstick Pipefish, Long-nosed Pipefish,		Species or species
Straight Stick Pipefish [66281]		habitat may occur within
		area
Mammals		
<u>Dugong dugon</u>		
Dugong [28]		Species or species
		habitat known to occur
		within area
Reptiles		
•		
Acalyptophis peronii		0
Horned Seasnake [1114]		Species or species
		habitat may occur within
		area
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species
Short-nosed Seasnake [1115]	Childany Endangered	Species or species
		habitat likely to occur
		within area
<u>Aipysurus duboisii</u>		
Dubois' Seasnake [1116]		Species or species
in the second of		habitat may occur within
		area
Ainvourus avdauvii		alea
Aipysurus eydouxii		
Spine-tailed Seasnake [1117]		Species or species
		habitat may occur within
		area
<u>Aipysurus laevis</u>		
Olive Seasnake [1120]		Species or species
Olive Seasilake [1120]		•
		habitat may occur within
		area
Astrotia stokesii		
Stokes' Seasnake [1122]		Species or species
• •		habitat may occur within
		area
Caretta caretta		aroa
Loggerhead Turtle [1763]	Endangered	Species or species
		habitat known to occur
		within area
<u>Chelonia mydas</u>		
Green Turtle [1765]	Vulnerable	Breeding known to occur
Creen rand [1700]	Valiforable	within area
Darwa askali va savisasa		Willin area
<u>Dermochelys coriacea</u>		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur
		within area
<u>Disteira kingii</u>		
Spectacled Seasnake [1123]		Species or species
Speciacieu Seasilake [1123]		•
		habitat may occur within
		area
<u>Disteira major</u>		
Olive-headed Seasnake [1124]		Species or species
. ,		habitat may occur within
		area
Emydocopholus appulatus		area
Emydocephalus annulatus		
Turtle-headed Seasnake [1125]		Species or species
		habitat may occur within
		area
Ephalophis greyi		
North-western Mangrove Seasnake [1127]		Species or species
. 13.11. 11301011 Mangrovo Oddonako [112/]		•
		habitat may occur within
		area

Name	Threatened	Type of Presence
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Hydrophis czeblukovi		
Fine-spined Seasnake [59233]		Species or species habitat may occur within area
Hydrophis elegans Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding 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 edeni Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat 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	Species or species habitat may occur within area
Grampus griseus Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to 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 Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur

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

[Resource Information]

Extra Information

Places on the RNE

Note that not all Indigenous sites may be listed.				
Name	State	Status		
Natural				
Coastal Margin Exmouth Gulf to Cape Preston	WA	Indicative Place		
Historic				
Old Onslow Townsite	WA	Indicative Place		
Invasive Species		[Resource Information]		
Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.				
Name	Status	Type of Presence		
Mammals				
Capra hircus				
Goat [2]		Species or species habitat likely to occur within area		
Equus asinus				
Donkey, Ass [4]		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		
Mus musculus		0		
House Mouse [120]		Species or species habitat likely to occur within area		
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species		
Vulpes vulpes		habitat likely to occur within area		
Red Fox, Fox [18]		Species or species habitat likely to occur within area		
Plants				
Cenchrus ciliaris				
Buffel-grass, Black Buffel-grass [20213] Parkinsonia aculeata		Species or species habitat likely to occur within area		
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree,		Species or species		
Horse Bean [12301]		habitat likely to occur		

Name
Status
Type of Presence
within area

Prosopis spp.
Mesquite, Algaroba [68407]
Species or species
habitat likely to occur
within area

Coordinates

-21.75193 115.01833

Caveat

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

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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:

- -Department of Environment, Climate Change and Water, New South Wales
- -Department of Sustainability and Environment, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment and Natural Resources, South Australia
- -Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
- -Environmental and Resource Management, Queensland
- -Department of Environment and Conservation, Western Australia
- -Department of the Environment, Climate Change, Energy and Water
- -Birds Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -SA 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, Atherton and Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- -State Forests of NSW
- -Geoscience Australia
- -CSIRO
- -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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Department of the Environment

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Your Ref:

Our Ref: **40-0914FL**Enquiries: Rebecca Kay
Phone: (08) 9334 0453

Email: flora.data@dpaw.wa.gov.au

RPS PO Box 465 Subiaco WA 6904

Attention: Giles Glasson

Dear Giles Glasson,

REQUEST FOR THREATENED AND PRIORITY FLORA INFORMATION

I refer to your request of 12 September 2014 for Threatened (Declared Rare) and Priority Flora information in the Ashburton area. The search was conducted within the area of the central coordinates you submitted with an additional 50km buffer.

A search was undertaken for this area of (1) the Department's *Threatened (Declared Rare) and Priority Flora* database (for results, *if any*, see "TPFL" – coordinates are GDA94), (2) the *Western Australian Herbarium Specimen* database for priority species opportunistically collected in the area of interest (for results, *if any*, see "WAHERB"- coordinates are GDA94 – see condition number 9 in the attached 'Conditions in Respect of Supply' and (3), the Department's *Threatened and Priority Flora List* [this list is searched using 'place names'. This list, which may also be used as a species target list, contains species that are declared rare (Conservation Code R or X for those presumed to be extinct), poorly known (Conservation Codes 1, 2 or 3), or require monitoring (Conservation Code 4) – for results, *if any*, see "TP List"]. The results are attached electronically to this email.

Attached also are the conditions under which this information has been supplied. Your attention is specifically drawn to the seventh point, which refers to the requirement to undertake field investigations for the accurate determination of Threatened and Priority flora occurrence at a site. The information supplied should be regarded as an indication only of the Threatened and Priority flora that may be present and may be used as a target list in any surveys undertaken.

The information provided does not preclude you from obtaining and complying with, where necessary, land clearing approvals from other agencies.

An invoice for \$300 (plus GST) to supply this information will be forwarded.

It would be appreciated if any populations of Threatened and Priority flora you encounter in the area could be reported to this Department to ensure their ongoing management.

If you require any further details, or wish to discuss Threatened and Priority flora management, please contact Dr Ken Atkins, Manager, Species and Communities Branch, on (08) 9334 0455.

Yours faithfully

Rebecca Kay

THREATENED FLORA DATABASE OFFICER for the Director General

19 September 2014

DEPARTMENT OF PARKS AND WILDLIFE

THREATENED (DECLARED RARE) AND PRIORITY FLORA INFORMATION

CONDITIONS IN RESPECT OF SUPPLY OF INFORMATION

- 1. All requests for data to be made in writing to the Director General, Department of Parks and Wildlife, Attention: Threatened Flora Database Officer, Species and Communities Branch.
- 2. The data supplied may not be supplied to other organisations, nor be used for any purpose other than for the project for which they have been provided, without the prior written consent of the Director General, Department of Parks and Wildlife.
- 3. Specific locality information for Threatened and Priority Flora is regarded as confidential, and should be treated as such by receiving organisations. Specific locality information may not be used in public reports without the written permission of the Director General, Department of Parks and Wildlife. Publicly available reports may only show generalised locations or, where necessary, show specific locations without identifying species. Species and Communities Branch is to be contacted for guidance on the presentation of Threatened and Priority Flora information.
- 4. Note that the Department of Parks and Wildlife respects the privacy of private landowners who may have Threatened and Priority Flora on their property. Threatened and Priority Flora locations identified in the data as being on private property should be treated in confidence, and contact with property owners made through the Department of Parks and Wildlife.
- 5. Receiving organisations should note that while every effort has been made to prevent errors and omissions in the data provided, they may be present. The Department of Parks and Wildlife accepts no responsibility for this.
- 6. Receiving organisations must also recognise that the database is subject to continual updating and amendment, and such considerations should be taken into account by the user.
- 7. It should be noted that the supplied data do not necessarily represent a comprehensive listing of the Threatened and Priority Flora of the area in question. Its comprehensiveness is dependant on the amount of survey carried out within the specified area. The receiving organisation should employ a botanist, if required, to undertake a survey of the area under consideration.
- 8. Acknowledgment of the Department of Parks and Wildlife as source of the data is to be made in any published material. The unique reference number that is given upon the request for information should be quoted when referencing the data. Copies of all such publications are to be forwarded to the Department of Parks and Wildlife, Attention: The Manager, Species and Communities Branch.
- 9. The development of the PERTH Herbarium database was not originally intended for electronic mapping (eg. GIS ArcView). The latitude and longitude coordinates for each entry are not verified prior to being databased. It is only in recent times that collections have been submitted with GPS coordinates. Therefore, be aware when using this data in ArcView that some records may not plot to the locality description given with each collection.

DECLARED RARE AND PRIORITY FLORA LIST

CONSERVATION CODES

for Western Australian taxa

T: Threatened Flora (Declared Rare Flora - Extant)
Schedule 1 under the Wildlife Conservation Act 1950 Rare Flora Notice

Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such. The assessment of the conservation status of these species is based on their national extent.

X: Presumed Extinct Flora (Declared Rare Flora – Extinct)
Schedule 2 under the Wildlife Conservation Act 1950 Rare Flora Notice

Taxa which have been adequately searched for and there is no reasonable doubt that the last individual has died, and have been gazetted as such.

Threatened Flora (Schedule 1) are further ranked by the Department according to their level of threat using IUCN Red List criteria:

CR: Critically Endangered – considered to be facing an extremely high risk of extinction in the wild.

EN: Endangered – considered to be facing a very high risk of extinction in the wild.

VU: Vulnerable – considered to be facing a high risk of extinction in the wild.

A list of the current rankings can be downloaded from DPAW's <u>Listing of species and ecological communities</u> webpage at

http://www.dpaw.wa.gov.au/plants-and-animals/threatened-species-and-communities

Species that have not yet been adequately surveyed to be listed under Schedule 1 or 2 are added to the Priority Flora and Priority Fauna Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened flora or fauna. Species that are adequately known, are rare but not threatened, or meet criteria for Near Threatened, or that have been recently removed from the threatened list for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring. Conservation Dependent species are placed in Priority 5.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

1: Priority One: Poorly-known species

Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.

2: Priority Two: Poorly-known species

Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.

3: Priority Three: Poorly-known species

Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.

4: Priority Four: Rare, Near Threatened and other species in need of monitoring

- (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These species are usually represented on conservation lands.
- (b) Near Threatened. Species that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.
- (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

5: Priority Five: Conservation Dependent species

Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

Recommendations for additions, deletions or changes to the Declared Rare and Priority Flora List should be forwarded to the Flora Administration Officer or Senior Botanist Species and Communities Branch, DEC.

Species and Communities Branch

17 Dick Perry Ave, Technology Park, Kensington
Phone: (08) 9334 0455 Fax: (08) 9334 0278
Locked Bag 104, Bentley Delivery Centre, Bentley, Western Australia 6983

ABBREVIATIONS USED IN THREATENED AND PRIORITY FLORA DATABASE

VESTI	NG	EDE	Educational Endowment
AAP	Aboriginal Planning Authority	EDU	Educational purposes UWA
AGR	Chief Executive, Dep. of Agriculture	ENE	Enjoyment of Natural Environ.
ALT	Aboriginal Land Trust	EPL	Ex-pastoral Lease (Sect 33(2) CALM Act)
APB	Agricultural Protection Board of WA	EPS	Explosives
BGP	Botanical Gardens & Parks Authority	EXC	Excepted from sale
BSA	Boy Scouts Association	EXL	Exploration Lease
CC	Conservation Commission – NPNCA - LFC	EXP	Experimental Farm
CGT	Crown Grant in Trust	FIR	Firing Range
COM	Commonwealth of Australia	FOR	State Forest
CRO	Crown Freehold-Govt Ownership	FP	Foreshore Purposes
CRW	Crown	GE	General Lease
DAG	Dep. of Agriculture	GHA	Grain Handling
DOW	Dep. of Water	GOL	Golf
DPI	Dep. of Planning	GRA GVT	Gravel Pit
EXD	Exec Direc CALM	HAR	Government Requirements Harbour Purposes
FES	Fire and Emergency Services Aust.	HEP	Heritage Purposes
HOW ILD	Dep. of Housing/State Housing Commission	HER	Heritage trail
LAC	Industrial Lands Develop. Auth	HOS	Hospital
LAC	LandCorp Shire/LGA	KEN	Kennels
MAG	Minister for Agriculture	LGA	LGA/Shire Requirements
MCB	Metropolitan Cemeteries Board	LPR	Landscape Protection
MED	Ministry of Education	MIN	Mining lease
MHE	Minister for Health	MUN	Municipal Purposes
MIN	Minister for Mines	NPK	National Park
MPL	Ministry for Planning	NRE	Nature Reserve
MPR	Minister for Prisons	OTH	Other
MRD	Main Roads WA	PAR	Parkland (& Recreation)
MTR	Minister for Transport	PAS	Pastoral lease
MWA	Minister for Water Resources	PCR	Proposed for Conservation
MWO	Minister for Works	PFF	Protection of Flora & Fauna
NAT	Natural Trust of Australia WA	PFL	Protection of Flora
NON	Not Vested	PIC	Picnic ground
PLB	Pastoral Lands Board	PLA	Plantation
PRI	Private/Freehold	PMC	Protection of Meteorite Crater
RAI	Public Transport Authority	POS	Public Open Space
REL	Religious Organisation	PPA	Public parkland
SPC	State Planning Commission	PRS	Prison site
SYN	Synergy (ex Western Power)	PUR	Purchase Lease
SWA	State of Western Australia	PUT	Public Utility
TEL	Telstra	QUA	Quarry
UNK	Unknown	RAC	Racecourse
WAT	Water Corporation	RAD	Radio Station
WEL	Minister Community Welfare	REC	Recreation
WRC	Water & Rivers Commission	REH	Rehabilitation/Re-establish Native Plants
XPL	Ex-Pastoral Lease	RRE	Railway Reserve
		RUB	Rubbish
PURPO		SAL	Saleyards Sand
ABR	Aboriginal Reserve	SAN SCH	School-site
ACC	Access Track	SET	Settlers requirements
AER	Aerodrome	SHO	Showgrounds
AIR	Airport	SNN	Sanitary
ARS	Agricultural Research Station	SOI	Soil Conservation
BAP	Baptist Union of WA	STO	Stopping place
CAM	Camping	STK	Stock Route
CAR CEM	Caravan park	TIM	Timber
CEM	Cemetery Conservation of Fauna	TOU	Tourism
CFA	Conservation of Flora & Fauna	TOW	Town-site
CFL	Conservation of Flora	TRA	Training Ground
CHU	Church	TRI	Trig station
CMN	Communications	UCL	Unallocated Crown Land
CMIN	Common	UNK	Unknown
COM	Conservation Park	VER	Road Verge
CPK	Car Park	VPF	Vermin Proof Fence
CRM	Conservation & Resource Management	WAT	Water
DEF	Defence	WLS	Wildlife Sanctuary
DRA	Drain	WOO	Firewood
			

ABBREVIATIONS USED IN THE WESTERN AUSTRALIAN HERBARIUM DATABASE

Geocode Method - The method that was used to record the latitude and longitude.

- **Auto** Indicates that the coordinate data in the record was created automatically (i.e. by software), usually by creating a coordinate from information provided in the <u>Nearest Named Place</u> or Locality textual description fields.
- **GAP** Acronym for "Generalised Arbitrary Point" as used in HISPID. GAP indicates that the coordinate data was obtained manually from the Nearest Named Place or Locality textual description fields.
- **GPS** Acronym for "Global Positioning System". GPS indicates that the coordinate data in the record was obtained from a GPS unit by the collector of the specimen.
- **MAN -** Shorthand for manual. MAN indicates that the coordinate data was created by hand using some method not allowed for by one of the other manual Geocode Method values, in particular, TOPO, GAP, or GPS.
- **TOPO -** Shorthand for topographic map. TOPO indicates that the coordinate data was obtained by plotting textual locality details against a topographic map.
- None Indicates that no coordinate data has been supplied by the collector.

Unknown - Indicates that there is no known method for determining the coordinate data. Should be used if the collector provided no indication of how they sampled the specimen's coordinate data.

PREC (Precision) - precision ratings for coordinates.

- **Precision 1**: Absolutely precise (to nearest 100m or nearest second) and must be GPS determined. For example 35°26'42"S 123°40'26"E
- **Precision 2**: Falling within a diameter of 3km (ca 2 minutes) or if no GPS mentioned in collecting notes. (The location must be able to be pinpointed on a 1:250 000 map, a spot locality. For example 35°26'42"S 123°40'26"E
- **Precision 3**: Falling within a diameter of 10km (ca 7 minutes) or for degrees and minutes, where seconds have not been given. For example 35°26' "S 123°40' "E
- Precision 4: Falling within a diameter of ca 50km (30 minutes). For example 35°26'_"S 123°40'_"E
- **Precision 5**: Where a location is a prescribed large geographical area within a state or only the state is given. Diameter is greater than 50km. For example 35°_'_"S 123°_'_"E
- Precision 6: used when localities are New Holland, Eastern Australia or Not given. Fields will be left blank.

PopId Nameid Taxon ConsStatus WARank PopNumbs SubPopCos Gda94Lat Gda94Long PopStatus Location District Vesting Purpose1 Purpose2 CountDate Method MatureCos JuvenileCo SeedlingCc LiveTotal PlantTypeC AreaOccup inFlower Population 94348 14110 Abutilon sp -21.7683 115.3389 PAS ####### Davis Bore KARRATHA PLB 0 0 94416 18359 Carpobroti 2 1 -21.4632 115.0196 Thevenard KARRATHACC CFF ######## 0 0

Taxon	Status	Rank	IUCNCriter EPBC	DECRegion	DECDistrict	Distribution	FloweringP Recovery
Abutilon sp. Onslow (F. Smith s.n. 10/9/61) PN		1		PILB	KARRATHA	Onslow, Yaraloola Stn	Sep
Eremophila forrestii subsp. viridis		3		PILB	KARRATHA	Onslow, Canning Stock Route	Aug
						Exmouth, Fortescue Marsh, Paraburdoo, Mulga Downs	
Eremophila youngii subsp. lepidota		4		GOLD,MWST,PILB	KALGOORLIE,EXMOUTH,KARRA	Stn., Jigalong Creek, Giralia Stn., Minilya	Mar,Jun
						Barlee Range N.R., Warralong Stn, Fortescue, Tom	
Euphorbia inappendiculata var. inappendiculata		2		PILB	KARRATHA	Price	May, Aug
Goodenia pallida		1		PILB	KARRATHA	Fortescue	
Myriocephalus nudus		1		PILB	EXMOUTH	Yannarie River	May,Aug,Sep
Sclerolaena stylosa		1		MWST,PILB	EXMOUTH, GERALDTON, SHARK	Shark Bay, Giralia Stn., Carbla	Aug
Tecticornia globulifera		1		PILB	KARRATHA	Fortescue Marsh	
Tecticornia medusa		3		PILB	KARRATHA	Roy Hill, Fortescue Marsh	Nov
Tecticornia sp. Christmas Creek (K.A. Shepherd & T. Colmer et al. KS 1063)		1		GOLD,PILB	KALGOORLIE,KARRATHA	Fortescue Marsh, Roy Hill Stn, Little Sandy Desert	Jul-Aug
Tephrosia rosea var. Port Hedland (A.S. George 1114) PN		1		PILB	KARRATHA	Peeawah River, Finucane Is.	Jul-Sep
Triumfetta echinata		3		PILB	KARRATHA	Peedamulla Stn, Varoo Stn	•

FID_	Sheet_no Taxon Co	ons_code Site	Vegetation	Locality	Lat	Long	Geocode_r Prec	Coll_Date F12
	PERTH 060 Abutilon sp	1		1 km S of 0	-21.6833	115.1333	MAN	3 03 08 1963
	PERTH 049 Abutilon u	1 Plain with	Hard humr	Davis Bore	-21.7683	115.3389	MAN	0 13 09 1996
	PERTH 074 Carpobroti	2 Low open	i	Thevenard	-21.4667	115.0167	GPS	2 23 06 1988
	PERTH 139 Carpobroti	2 Coarse wh	İ	Thevenard	-21.4632	115.0196	UNK	2 24 08 1990
	PERTH 084 Eleocharis	3 Broad drai	Mosaic of	Site: 567_I	-21.7389	114.9799	GPS	1 14 03 2011
	PERTH 083 Eremophila	3 Dune. Red	Tall shrubla	Onslow	-21.8671	115.1649	GPS	1 02 09 2011
	PERTH 085 Eremophila	3 Red sands	Acacia tetr	Ca 30 km 9	-21.7756	115.054	GPS	1 19 08 2009
	PERTH 406 Eremophila	3		10 miles S	-21.7828	115.1117	AUTO	3 28 08 1960
	PERTH 081 Triumfetta	3 Dune. Red	Shrubland	Ca 16 km 5	-21.7771	115.0854	GPS	1 01 11 2009
	PERTH 046 Triumfetta	3 Slope of sa	Soft humm	Ca 35 km l	-21.5997	115.2939	MAN	0 05 11 1996
	PERTH 080 Triumfetta	3 Ridge. Red	Low open \	ca 25 km S	-21.8264	115.1401	GPS	1 14 11 2008
	PERTH 080 Triumfetta	3 Flat. Red-b	Open Shru	ca 50 km S	-21.9767	115.3162	GPS	1 14 11 2008
	PERTH 154 Triumfetta	3 Growing o	With soft s	20 km E of	-21.6381	115.3439	AUTO	3 25 10 1980
	PERTH 154 Triumfetta	3		12 miles S	-21.8119	115.1117	AUTO	3 28 05 1962
	PERTH 080 Vigna sp. c	2 Sandy plai	Triodia epa	N Ashburt	-21.6887	115.0098	GPS	1 02 04 2009
	PERTH 080 Vigna sp. c	2 Plain with	Triodia epa	N Ashburt	-21.6887	115.0065	GPS	1 18 07 2008
	PERTH 080 Vigna sp. c	2 Sandplains	Triodia epa	Onslow	-21.6867	115.0128	GPS	1 18 07 2008



NatureMap Species Report

Created By Guest user on 15/09/2014

Current Names Only Yes

Core Datasets Only Yes

Method 'By Circle'

Centre 115°01' 05" E,21°45' 06" S

Buffer 25km

Group By Conservation Status

Conservation Status	Species	Records
Non-conservation taxon	673	19845
Other specially protected fauna	3	12
Priority 1	2	2
Priority 2	1	3
Priority 3	4	8
Priority 4	7	51
Protected under international agreement	26	179
Rare or likely to become extinct	16	56
TOTAL	732	20156

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Quer Area
Rare or like	ly to bed	come extinct			
1.	-	Calidris canutus subsp. rogersi (Red Knot (north-eastern Siberia))		Т	
2.	24784	Calidris ferruginea (Curlew Sandpiper)		Т	
3.	24790	Calidris tenuirostris (Great Knot)		Т	
4.	24372	Charadrius leschenaultii subsp. leschenaultii (Greater Sand Plover (Mongolian))		Т	
5.	25576	Charadrius mongolus (Lesser Sand Plover)		Т	
6.	25336	Chelonia mydas (Green Turtle)		T	
7.	24093	Dasyurus hallucatus (Northern Quoll)		Т	
8.	25238	Liasis olivaceus subsp. barroni (Pilbara Olive Python)		T	
9.	24796	Limosa lapponica subsp. menzbieri (Bar-tailed Godwit (northern Siberian))		T	
10.	25344	Natator depressus (Flatback Turtle)		T	
11.	24798	Numenius madagascariensis (Eastern Curlew)		T	
12.	25504	Perameles bougainville (Western Barred Bandicoot, Marl)		Т	
13.	24743	Pezoporus occidentalis (Night Parrot)		T	
14.	34037	Pristis zijsron (Green Sawfish)		Т	
15.	24530	Sterna nereis subsp. nereis (Fairy Tern)		Т	
Protected u	ınder int	ernational agreement			
16.		Actitis hypoleucos (Common Sandpiper)		IA	
17.		Apus pacificus (Fork-tailed Swift)		IA	
18.		Ardea modesta (Eastern Great Egret)		IA	
19.	25560	Ardea sacra (Eastern Reef Egret, Eastern Reef Heron)		IA	
20.	25736	Arenaria interpres (Ruddy Turnstone)		IA	
21.		Calidris acuminata (Sharp-tailed Sandpiper)		IA	
22.	24780	Calidris alba (Sanderling)		IA	
23.		Calidris ruficollis (Red-necked Stint)		IA	
24.		Charadrius leschenaultii (Greater Sand Plover)		IA	
25.	24378	Charadrius veredus (Oriental Plover)		IA	
26.		Glareola maldivarum (Oriental Pratincole)		IA	
27.		Haliaeetus leucogaster (White-bellied Sea-Eagle)		IA	
28.		Limosa Iapponica (Bar-tailed Godwit)		IA	
29.		Merops ornatus (Rainbow Bee-eater)		IA	
30.		Numenius minutus (Little Curlew)		IA	
31.		Numenius phaeopus (Whimbrel)		IA	
32.		Oceanites oceanicus (Wilson's Storm Petrel)		IA	
33.		Pluvialis squatarola (Grey Plover)		IA	
34.		Sterna bengalensis (Lesser Crested Tern)		IA	
35.		Sterna caspia (Caspian Tern)		IA	
36.		Sterna dougallii (Roseate Tern)		IA	
37.		Sterna hirundo (Common Tern)		IA	
38.		Sterna leucoptera (White-winged Black Tern)		IA	
		, , ,			

NatureMap is a collaborative project of the Department of Environment and Conservation, Western Australia, and the Western Australian Museum.







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Que Area
39.	24803	Tringa brevipes (Grey-tailed Tattler)		IA	
40.	24806	Tringa glareola (Wood Sandpiper)		IA	
41.	24808	Tringa nebularia (Common Greenshank)		IA	
Other spec	ially prot	ected fauna			
42.		Crocodylus porosus (Salt-water Crocodile)		S	
43.		Dugong dugon (Dugong)		S	
44.	25624	Falco peregrinus (Peregrine Falcon)		S	
Priority 1					
45.	43021	Abutilon sp. Pritzelianum (S. van Leeuwen 5095)		P1	
46.	25164	Lerista planiventralis subsp. maryani (Keeled Slider (NW coast Onslow to Barradale),		D 4	
		skink)		P1	
Priority 2					
47.	20671	Vigna sp. central (M.E. Trudgen 1626)		P2	
Priority 3	04047	Electric was illes			
48.		Eleocharis papillosa		P3	
49.		Eremophila forrestii subsp. viridis Pristis microdon (Freshwater Sawfish)		P3	
50. 51.		Triumfetta echinata		P3 P3	
31.	17324	Triumicua ecimata		P3	
Priority 4					
52.		Ardeotis australis (Australian Bustard)		P4	
53.		Burhinus grallarius (Bush Stone-curlew)		P4	
54.		Leggadina lakedownensis (Short-tailed Mouse, Karekanga)		P4	
55.		Phaps histrionica (Flock Bronzewing, Flock Pigeon)		P4	
56.		Pseudomys chapmani (Western Pebble-mound Mouse, Ngadji)		P4	
57.		Sousa chinensis (Indo-Pacific Humpback Dolphin)		P4	
58.	24067	Stennella longirostris subsp. longirostris (Spinner Dolphin)		P4	
lon-conse	rvation ta	axon			
59.	-14089	??			
60.	-16040	Ablennes hians			
61.	-16986	Abudefduf bengalensis			
62.		Abutilon lepidum			
63.		Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)			
64.		Acacia ancistrocarpa (Fitzroy Wattle)			
65.		Acacia bivenosa			
66.		Acacia citrinoviridis			
67.		Acacia colei var. colei			
68. 69.		Acacia coriacea subsp. coriacea Acacia cyperophylla var. cyperophylla			
70.		Acacia gregorii (Gregory's Wattle)			
70.		Acacia sclerosperma subsp. sclerosperma			
72.		Acacia sp. Ripon Hills (B.R. Maslin 8460)			
73.		Acacia stellaticeps			
74.		Acacia tetragonophylla (Kurara, Wakalpuka)			
75.		Acacia trachycarpa (Minni Ritchi, Balgali)			
76.		Acacia wiseana			
77.		Acanthocepola abbreviata			
78.		Acanthopagrus latus			
79.		Acanthopagrus palmaris			
80.		Acanthophis pyrrhus (Desert Death Adder)			
81.		Accipiter cirrocephalus (Collared Sparrowhawk)			
82.		Accipiter fasciatus (Brown Goshawk)			
02.		Acontrogobius viridinunotatus			
83.	-15954	Acentrogobius viridipunctatus			
		Adriana tomentosa var. tomentosa			
83.	17422				
83. 84.	17422 -17061	Adriana tomentosa var. tomentosa			
83. 84. 85.	17422 -17061 25544	Adriana tomentosa var. tomentosa Adventor elongatus	Y		
83. 84. 85. 86.	17422 -17061 25544 2646	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar)	Y		
83. 84. 85. 86.	17422 -17061 25544 2646 3680	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush)	Y		
83. 84. 85. 86. 87.	17422 -17061 25544 2646 3680 25355	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea)	Y		
83. 84. 85. 86. 87. 88.	17422 -17061 25544 2646 3680 25355 -16972	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake)	Y		
83. 84. 85. 86. 87. 88. 89.	17422 -17061 25544 2646 3680 25355 -16972 2652	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica	Y		
83. 84. 85. 86. 87. 88. 89. 90.	17422 -17061 25544 2646 3680 25355 -16972 2652 4907	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica Alternanthera nodiflora (Common Joyweed)	Y		
83. 84. 85. 86. 87. 88. 89. 90. 91.	17422 -17061 25544 2646 3680 25355 -16972 2652 4907 -17085	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica Alternanthera nodiflora (Common Joyweed) Alyogyne pinoniana (Sand Hibiscus)	Y		
83. 84. 85. 86. 87. 88. 89. 90. 91. 92.	17422 -17061 25544 2646 3680 25355 -16972 2652 4907 -17085 -14392	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica Alternanthera nodiflora (Common Joyweed) Alyogyne pinoniana (Sand Hibiscus) Ambassis agassizi	Y		
83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94.	17422 -17061 25544 2646 3680 25355 -16972 2652 4907 -17085 -14392 -17037 -16970	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica Alternanthera nodiflora (Common Joyweed) Alyogyne pinoniana (Sand Hibiscus) Ambassis agassizi Ambassis gymnocephalus Amniataba caudavittata Amniataba percoides	Y		
83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94.	17422 -17061 25544 2646 3680 25355 -16972 2652 4907 -17085 -14392 -17037 -16970 -16787	Adriana tomentosa var. tomentosa Adventor elongatus Aegotheles cristatus (Australian Owlet-nightjar) Aerva javanica (Kapok Bush) Aeschynomene indica (Budda Pea) Aipysurus laevis (Olive Seasnake) Alectis indica Alternanthera nodiflora (Common Joyweed) Alyogyne pinoniana (Sand Hibiscus) Ambassis agassizi Ambassis gymnocephalus Amniataba caudavittata	Y		Y







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
99.	30833	Amphibolurus longirostris (Long-nosed Dragon)			
100.	-11939	Aname ellenae			
101.	24312	Anas gracilis (Grey Teal)			
102.	24316	Anas superciliosa (Pacific Black Duck)			
103.	7822	Angianthus acrohyalinus (Hook-leaf Angianthus)			
104.	7832	Angianthus milnei (Cone-spike Angianthus)			
105.		Anhinga melanogaster (Darter)			
106.		Antaresia stimsoni (Stimson's Python)			
107.		Antaresia stimsoni subsp. stimsoni (Stimson's Python)			
108.		Anthus australis (Australian Pipit)			
109.		Apistus carinatus			
110.		Apogon rueppellii			
111.		Aquila audax (Wedge-tailed Eagle)			
112. 113.		Aquila morphnoides (Little Eagle) Ardea alba (Great Egret)			
114.		Ardea garzetta (Little Egret)			
115.		Ardea intermedia (Intermediate Egret)			
116.		Ardea novaehollandiae (White-faced Heron)			
117.		Ardea pacifica (White-necked Heron)			
118.		Aristida contorta (Bunched Kerosene Grass)			
119.		Aristida holathera var. holathera			
120.	215	Aristida latifolia (Feathertop Wiregrass)			
121.		Arothron manilensis			
122.	-14218	Arrhamphus sclerolepis			
123.	25566	Artamus cinereus (Black-faced Woodswallow)			
124.	24353	Artamus cyanopterus (Dusky Woodswallow)			
125.	25567	Artamus leucorynchus (White-breasted Woodswallow)			
126.	24356	Artamus personatus (Masked Woodswallow)			
127.		Asparagopsis taxiformis			
128.		Aspidites melanocephalus (Black-headed Python)			
129.		Assiculus punctatus			
130.		Attelomycterus fasciatus			
131.		Atherinancy and controls			
132. 133.		Atherinomorus endrachtensis Atherinomorus vaigiensis			
134.		Atriplex bunburyana (Silver Saltbush)			
135.		Atriplex codonocarpa (Flat-topped Saltbush)			
136.		Atriplex semilunaris (Annual Saltbush)			
137.		Aulopus purpurissatus			
138.		Austronibea oedegenys?			Υ
139.	233	Avena barbata (Bearded Oat)	Υ		
140.	26498	Avrainvillea obscura			
141.	24318	Aythya australis (Hardhead)			
142.	-15645	Bathygobius cocosensis			
143.	-14919	Bathygobius fuscus			
144.	5185	Bergia perennis			
145.	-16494	Blennodesmus scapularis			
146.		Bodianus frenchii			
147.		Bonamia erecta			
148.		Bos taurus (European Cattle)	Y		
149. 150		Brachyscome cheilocarpa Prachyscome cilicoarpa			
150. 151.		Brachyscome ciliocarpa Brassica tournefortii (Mediterranean Turnip)	Υ		
151.		Buchnera linearis (Blackrod)	ı		
153.		Bulbostylis barbata			
154.		Butis amboinensis			
155.		Butorides striatus (Striated Heron, Mangrove Heron)			
156.		Butorides striatus subsp. stagnatilis (Striated Heron, Mangrove Heron)			
157.	25715	Cacatua roseicapilla (Galah)			
158.	25716	Cacatua sanguinea (Little Corella)			
159.	42307	Cacomantis pallidus (Pallid Cuckoo)			
160.		Calandrinia polyandra (Parakeelya)			
161.		Calotis plumulifera			
162.		Canavalia rosea (Wild Jack Bean)			
163.		Canis lupus (Dog, Dingo)	Y		
164.		Canthigaster coronata			
165.		Caranx ignobilis			
166. 167		Caranx sexfasciatus			
167. 168.		Cassytha aurea var. aurea Cenchrus ciliaris (Buffel Grass)	Y		
100.	230	Contrate Guidito (Dullet Oracs)	ī		
				Departmen	of







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
169.		Centipeda minima subsp. macrocephala			
170.		Centriscus sp.			
171. 172.		Centropus phasianinus (Pheasant Coucal) Certhionyx variegatus (Pied Honeyeater)			
173.		Chaerephon jobensis (Northern Freetail-bat)			
174.		Chaetodontoplus duboulayi			
175.	-14947	Chanos chanos			
176.		Charadrius melanops (Black-fronted Dotterel)			
177.		Charadrius ruficapillus (Red-capped Plover)			
178. 179.		Chelmon marginalis Chelonodon patoca			
180.		Chenonetta jubata (Australian Wood Duck, Wood Duck)			
181.		Cheramoeca leucosternus (White-backed Swallow)			
182.	-16211	Chirocentrus dorab			
183.		Chloris pectinata (Comb Chloris)			
184.		Chloris pumilio			
185. 186.		Choerodon cyanodus Chrysococcyx basalis (Horsfield's Bronze Cuckoo)			
187.		Chrysococcyx osculans (Flack-eared Cuckoo)			
188.		Chrysopogon fallax (Golden Beard Grass)			
189.	24833	Cincloramphus cruralis (Brown Songlark)			
190.		Cincloramphus mathewsi (Rufous Songlark)			
191.		Circus approximans (Swamp Harrier)			
192. 193.		Circus assimilis (Spotted Harrier) Cleome viscosa (Tickweed, Tjinduwadhu)			
193.		Codonocarpus cotinifolius (Native Poplar, Kundurangu)			
195.		Colluricincla harmonica (Grey Shrike-thrush)			
196.	-15704	Colurodontis paxmani			
197.	25568	Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
198.		Coradion chrysozonus			
199. 200.		Corchorus sidoides subsp. vermicularis Coris aygula			
200.		Corvus bennetti (Little Crow)			
202.		Corvus orru (Torresian Crow)			
203.	17084	Corymbia zygophylla			
204.	1284	Corynotheca flexuosissima			
205.		Corynotheca pungens			
206. 207.		Coturnix pectoralis (Stubble Quail) Coturnix ypsilophora (Brown Quail)			
208.		Cracticus nigrogularis (Pied Butcherbird)			
209.		Cracticus tibicen (Australian Magpie)			
210.	-14049	Cracticus tibicen subsp. longirostris			Υ
211.		Cracticus torquatus (Grey Butcherbird)			
212.		Craterocephalus capreoli			
213. 214.		Cressa australis Crotalaria cunninghamii (Green Birdflower, Bilbun)			
215.		Crotalaria cunninghamii subsp. sturtii			
216.		Crotalaria medicaginea var. neglecta			
217.	-13208	Cryptoerithus occultus			
218.		Ctenophorus caudicinctus (Ring-tailed Dragon)			
219. 220.		Ctenophorus caudicinctus subsp. caudicinctus (Ring-tailed Dragon) Ctenophorus femoralis (Dune Dragon)			
220.		Ctenophorus isolepis (Crested Dragon, Military Dragon)			
222.		Ctenophorus isolepis subsp. gularis (Central Military Dragon)			
223.	24876	Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)			
224.		Ctenophorus nuchalis (Central Netted Dragon)			
225.		Ctenophorus rubens (Red Dragon)			
226. 227.		Ctenophorus rufescens (Red Rock Dragon) Ctenotrynguchen microcenhalus			
227.		Ctenotrypauchen microcephalus Ctenotus calurus			
229.		Ctenotus grandis			
230.	25043	Ctenotus grandis subsp. titan			
231.		Ctenotus hanloni			
232.		Ctenotus iapetus			
233. 234.		Ctenatus pantherinus (Leonard Ctenatus)			
234.		Ctenotus pantherinus (Leopard Ctenotus) Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)			
236.		Ctenotus quattuordecimlineatus			
237.	25069	Ctenotus rufescens			
238.	25073	Ctenotus saxatilis (Rock Ctenotus)			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
239.	25074	Ctenotus schomburgkii			
240.	17117	Cullen cinereum			
241.		Cullen martinii			
242.		Cyclorana maini (Sheep Frog)			
243. 244.		Cyclorana platycephala (Water-holding Frog) Cygnus atratus (Black Swan)			
245.		Cymbacephalus staigeri?			
246.		Cyperus bulbosus (Bush Onion, Tjanmata)			
247.		Cyperus pygmaeus			
248.	809	Cyperus rigidellus			
249.	814	Cyperus squarrosus			
250.	25547	Dacelo leachii (Blue-winged Kookaburra)			
251.	24304	Dacelo leachii subsp. leachii (Blue-winged Kookaburra)			
252.		Dactyloptena papilio			
253.		Dactylopus dactylopus			
254. 255.		Dasykaluta rosamondae (Little Red Kaluta)			
255. 256.		Decazesia hecatocephala Delma haroldi			
257.		Delma nasuta			
258.		Delma tincta			
259.	25468	Demansia psammophis (Yellow-faced Whipsnake)			
260.	25295	Demansia psammophis subsp. cupreiceps (Yellow-faced Whipsnake)			
261.	311	Digitaria ciliaris (Summer Grass)	Υ		
262.	24926	Diplodactylus conspicillatus (Fat-tailed Gecko)			
263.	24940	Diplodactylus pulcher			
264.		Diplopeltis eriocarpa (Hairy Pepperflower)			
265.		Diporiphora adductus (Carnarvon Dragon)			
266. 267.		Drepane punctata			
267.		Dromaius novaehollandiae (Emu) Drombus triangularis			
269.		Dysphania kalpari (Rat's Tail, Kalpari)			
270.		Dysphania plantaginella			
271.		Echeneis naucrates			
272.	340	Echinopogon ovatus (Hedgehog Grass)			
273.	14301	Ehretia saligna var. saligna			
274.	25540	Elanus caeruleus (Black-shouldered Kite)			
275.		Elops hawaiensis			
276.		Emblema pictum (Painted Finch)			.,
277. 278.		Engraulis australis?			Y
279.		Ephalophis greyae Ephippiorhynchus asiaticus subsp. australis (Black-necked Stork)			
280.		Epinephelus amblycephalus			
281.		Epinephelus corallicola			
282.	-14255	Epinephelus lanceolatus			
283.	-14249	Epinephelus malabaricus			
284.	-14920	Epinephelus multinotatus			
285.		Epinephelus quoyanus			
286.		Epinephelus rankini (invalid)			Υ
287.		Epinephelus rivulatus			
288. 289.		Epinephelus sexfasciatus Epinephelus sp.			
289. 290.		Epinephelus tauvina			
290.		Epthianura aurifrons (Orange Chat)			
292.		Epthianura tricolor (Crimson Chat)			
293.	378	Eragrostis dielsii (Mallee Lovegrass)			
294.	381	Eragrostis falcata (Sickle Lovegrass)			
295.	393	Eragrostis setifolia (Neverfail Grass)			
296.	42404	Eremiascincus isolepis			
297.	43381	Eremiascincus pallidus (Western Narrow-banded Skink, Narrow-banded Sand			
600	0.400=	Swimmer)			
298.		Eremiornis carteri (Spinifex-bird)			
299. 300.		Eremophila fraseri subsp. fraseri Eriachne benthamii (Swamp Wanderrie)			
300.		Eriachne flaccida (Claypan Grass)			
302.		Eriachne gardneri			
303.		Eriachne obtusa (Northern Wandarrie Grass)			
304.		Eriochloa pseudoacrotricha (Perennial Cupgrass)			
305.	4335	Erodium cygnorum (Blue Heronsbill)			
306.		Erythrogonys cinctus (Red-kneed Dotterel)			
307.	-14592	Escualosa thoracata			Y







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
308.	35343	Eucalyptus camaldulensis subsp. refulgens			
309.	14548	Eucalyptus victrix			
310.		Eucalyptus xerothermica			
311.		Eulalia aurea			
312.		Euphorbia hirta (Asthma Plant)	Υ		
313. 314.		Euphorbia myrtoides Euphorbia tannensis subsp. eremophila (Desert Spurge)			
315.		Eurostopodus argus (Spotted Nightjar)			
316.		Eurypegasus draconis			
317.		Falco berigora (Brown Falcon)			
318.		Falco cenchroides (Australian Kestrel)			
319.	24472	Falco cenchroides subsp. cenchroides (Australian Kestrel)			
320.	25623	Falco longipennis (Australian Hobby)			
321.	24476	Falco subniger (Black Falcon)			
322.	24041	Felis catus (Cat)	Υ		
323.		Feroxodon multistriatus			
324.		Fistularia petimba	.,		
325.		Flaveria trinervia (Speedy Weed)	Υ		
326. 327.		Fordonia leucobalia (White-bellied Mangrove Snake) Frankenia ambita			
328.		Furina ornata (Moon Snake)			
329.		Gavicalis virescens (Singing Honeyeater)			
330.		Gehyra australis			
331.		Gehyra pilbara			
332.	24958	Gehyra punctata			
333.	24957	Gehyra purpurascens			
334.	24959	Gehyra variegata			
335.		Geopelia cuneata (Diamond Dove)			
336.		Geopelia humeralis (Bar-shouldered Dove)			
337.		Geopelia striata (Zebra Dove)			
338. 339.		Geopelia striata subsp. placida (Peaceful Dove)			
340.		Geophaps plumifera (Spinifex Pigeon) Gerres filamentosus			
341.		Gerres oyena			
342.		Gerres sp.			
343.		Gerres subfasciatus			
344.	25531	Gerygone levigaster (Mangrove Gerygone)			
345.	24276	Gerygone tenebrosa (Dusky Gerygone)			
346.	2835	Glinus lotoides (Hairy Carpet Weed)			
347.		Gnephosis arachnoidea (Cobwebby-headed Gnephosis)			
348.		Goodenia corynocarpa			
349. 350.		Goodenia microptera			
351.		Goodenia pascua Gossypium australe (Native Cotton)			
352.		Gossypium hirsutum (Upland Cotton)	Υ		
353.		Grallina cyanoleuca (Magpie-lark)			
354.		Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)			
355.	19570	Grevillea pyramidalis subsp. leucadendron			
356.	2096	Grevillea stenobotrya			
357.		Grus rubicunda (Brolga)			
358.		Gymnothorax undulatus			
359.		Gymnura australis			
360. 361.		Gyrostemon ramulosus (Corkybark) Haematopus fuliginosus (Sooty Oystercatcher)			
361.		Haematopus longirostris (Pied Oystercatcher)			
363.		Hakea lorea subsp. lorea			
364.		Hakea stenophylla subsp. stenophylla			
365.		Haliastur indus (Brahminy Kite)			
366.	24294	Haliastur indus subsp. girrenera (Brahminy Kite)			
367.	24295	Haliastur sphenurus (Whistling Kite)			
368.		Halophryne diemensis			
369.		Halophryne ocellatus			
370.		Haloragis gossei			
371.		Haloragis gossei var. inflata			
372. 373.		Hamirostra melanosternon (Black-breasted Buzzard) Hamirostra melanosternon (Black-breasted Buzzard)			
373. 374.		Hannafordia quadrivalvis subsp. recurva Heliotropium chrysocarpum			
374. 375.		Heliotropium crispatum			
376.		Heliotropium curassavicum (Smooth Heliotrope)			
377.		Heliotropium heteranthum			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
378.		Heliotropium pachyphyllum			
379.		Hemidactylus frenatus (Asian House Gecko)	Υ		
380. 381.		Hemigaleus australiensis Hemigaleus sp.			
382.		Hemiramphus robustus			
383.		Hemiscyllium trispeculare			
384.	-15286	Herklotsichthys blackburni			
385.	-16148	Herklotsichthys collettei			
386.		Herklotsichthys collettei?			Υ
387.		Herklotsichthys koningsbergeri			
388. 389.		Herklotsichthys quadrimaculatus Heteronotia binoei (Bynoe's Gecko)			Y
390.		Hilsa kelee?			Y
391.		Himantopus himantopus (Black-winged Stilt)			
392.	-15020	Hippocampus sp.			
393.	-17128	Hippocampus tuberculatus			
394.		Hirundo ariel (Fairy Martin)			
395.		Hirundo neoxena (Welcome Swallow)			
396.		Hirundo nigricans (Tree Martin) Holconia westralia			
397. 398.		Hydrophis major			
399.		Hydrophis ornatus			
400.		Hydrophis stokesii (Stoke's Seasnake, Sea Snake)			
401.	-18131	Hypopterus macropterus			
402.		Indigofera boviperda			
403.		Indigofera colutea (Sticky Indigo)			
404.		Indigofera georgei (Bovine Indigo)			
405. 406.		Indigofera linifolia Indigofera linnaei (Birdsville Indigo)			
407.		Indigofera monophylla			
408.		Inimicus sinensis			
409.	6624	Ipomoea costata (Rock Morning Glory, Kanti)			
410.	11312	Ipomoea pes-caprae subsp. brasiliensis			
411.		Ipomoea quamoclit (Cupid's Flower)	Υ		
412. 413.		Iseilema eremaeum Istiblennius meleagris			
414.		Lactoria cornuta			
415.		Lactoria diaphana			
416.	24367	Lalage tricolor (White-winged Triller)			
417.	25637	Larus novaehollandiae (Silver Gull)			
418.		Lawrencia viridigrisea			
419.		Leiognathus decorus			
420. 421.		Leiognathus equulus Lepidium muelleri-ferdinandii			
422.		Lepidium platypetalum (Slender Peppercress)			
423.		Lerista baynesi			
424.	25125	Lerista bipes			
425.	30928	Lerista clara			
426.		Lerista elegans			
427. 428		Lerista onsloviana			
428. 429.		Lerista uniduo (Spotted Broad-blazed Slider, skink) Lethrinus sp.			
430.		Leucaena leucocephala (Leucaena)	Υ		
431.		Lialis burtonis			
432.	25661	Lichmera indistincta (Brown Honeyeater)			
433.		Lichmera indistincta subsp. indistincta (Brown Honeyeater)			
434.		Litoria caerulea (Green Tree Frog)			
435. 436.		Litoria rubella (Little Red Tree Frog) Liza melinoptera			
437.		Liza melinopiera Liza sp.			
438.		Liza subviridis			
439.		Liza vaigiensis			
440.	-16483	Lophiocharon trisignatus			
441.		Lotus cruentus (Redflower Lotus)			
442.		Lucasium stenodactylum			
443. 444.		Lutjanus argentimaculatus Lutjanus erythropterus			
445.		Lutjanus fulviflamma			
446.		Lutjanus malabaricus			
447.	-18157	Lutjanus russellii			







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
448.		Macropus robustus (Euro)			
449.		Macropus rufus (Red Kangaroo, Marlu)			
450.		Maireana lobiflora			
451. 452.		Malurus lamberti (Variegated Fairy-wren) Malurus leucopterus (White-winged Fairy-wren)			
453.		Malvastrum americanum (Spiked Malvastrum)	Υ		
454.		Manorina flavigula (Yellow-throated Miner)			
455.		Megalaspis cordyla			
456.		Megalops cyprinoides			
457.		Melopsittacus undulatus (Budgerigar)			
458.	-14960	Mene maculata			
459.	25184	Menetia greyii			
460.	25542	Milvus migrans (Black Kite)			
461.	24298	Milvus migrans subsp. affinis (Black Kite)			
462.		Mimulus gracilis			
463.		Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)			
464.		Mirafra javanica subsp. horsfieldii (Horsfield's Bushlark, Singing Bushlark)			
465.		Monocentris japonicus			
466. 467.		Morethia ruficauda subsp. exquisita Morethia ruficauda subsp. ruficauda			
468.		Muellerolimon salicorniaceum			
469.		Mugil cephalus			
470.		Muraenesox cinereus			
471.		Murchisonia volubilis			
472.	24223	Mus musculus (House Mouse)	Υ		
473.	17158	Myoporum montanum (Native Myrtle)			
474.	17925	Myriocephalus oldfieldii			
475.	8121	Myriocephalus rudallii			
476.	-17866	Nematalosa come			
477.		Nematalosa sp.			
478.		Nematalosa vlaminghi			
479.		Neobassia astrocarpa			
480.		Neobatrachus aquilonius (Northern Burrowing Frog)			
481. 482.		Neobatrachus fulvus (Tawny Trilling Frog) Neochmia ruficauda (Star Finch)			
483.		Neopomacentrus filamentosus			
484.		Nephrurus levis			
485.		Nephrurus levis subsp. occidentalis			
486.	24969	Nephrurus levis subsp. pilbarensis			
487.	-16373	Netuma thalassina			Υ
488.	11856	Nicotiana occidentalis subsp. occidentalis			
489.	24095	Ningaui timealeyi (Pilbara Ningaui)			
490.	25748	Ninox novaeseelandiae (Boobook Owl)			
491.		Notaden nichollsi (Desert Spadefoot)			
492.		Notomys alexis (Spinifex Hopping-mouse)			
493.		Nymphicus hollandicus (Cockatiel)			
494.		Ocyphaps lophotes (Crested Pigeon)			
495.		Oenothera laciniata Ologria sp. Konnady Pango (G. Ryrna 66)	Y		
496. 497.		Olearia sp. Kennedy Range (G. Byrne 66) Omobranchus punctatus			
498.		Ophichthus cephalozona			
499.		Oreoica gutturalis (Crested Bellbird)			
500.		Oryctolagus cuniculus (Rabbit)	Υ		
501.		Pachycephala lanioides (White-breasted Whistler)			
502.	24299	Pandion haliaetus subsp. cristatus (Osprey)			
503.	503	Panicum decompositum (Native Millet, Kaltu-kaltu)			
504.	-17036	Paracentropogon vespa			
505.	-17047	Parachaeturichthys polynema			
506.		Paractaenum novae-hollandiae subsp. novae-hollandiae			
507.		Paractaenum refractum			
508.		Paraplagusia bilineata			
509.		Paraplotosus albilabris			
510. 511		Parastromateus niger Parastromateus niger Parastromateus (Rechrowed Parastrol			
511. 512.		Pardalotus rubricatus (Red-browed Pardalote) Parkinsonia aculeata (Parkinsonia)	Υ		
512.		Passer montanus (Eurasian Tree Sparrow)	Y		
514.		Pelates octolineatus	•		
515.		Pelecanus conspicillatus (Australian Pelican)			
516.		Pellona ditchela			
517.	-16486	Pentapodus sp.			







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518.		Pentapodus vitta			
519.		Peplidium sp. C Evol. Fl. Fauna Arid Aust. (N.T. Burbidge & A. Kanis 8158)			
520.		Periophthalmus argentilineatus Peristrominous dolosus			
521. 522.		Phalacrocorax carbo (Great Cormorant)			
523.		Phalacrocorax melanoleucos (Little Pied Cormorant)			
524.		Phalacrocorax sulcirostris (Little Black Cormorant)			
525.		Phalacrocorax varius (Pied Cormorant)			
526.	24409	Phaps chalcoptera (Common Bronzewing)			
527.	1042	Phoenix dactylifera (Date Palm)	Υ		
528.	5230	Pimelea ammocharis			
529.		Pisodonophis cancrivorus			
530.		Planigale ingrami (Long-tailed Planigale)			
531. 532.		Platax teira Platycephalus indicus			
533.		Platycephalus sp.			
534.		Platycercus zonarius (Australian Ringneck, Ring-necked Parrot)			
535.		Platycercus zonarius subsp. zonarius (Port Lincoln Parrot)			
536.	-16043	Plectorhinchus flavomaculatus			
537.	-16071	Plectorhinchus gibbosus			
538.	-17563	Plectorhinchus polytaenia			
539.		Plotosus lineatus			
540.		Pluchea longiseta			
541. 542.		Pluchea rubelliflora Pogona minor (Dwarf Bearded Dragon)			
543.		Pogona minor (Dwarf Bearded Dragon) Pogona minor subsp. minor (Dwarf Bearded Dragon)			
544.		Polydactylus multiradiatus			
545.		Polydactylus plebius			
546.	4572	Polygala isingii			
547.	-17575	Pomadasys argenteus			
548.		Pomadasys kaakan			
549.		Pomatomus saltatrix			
550.		Pomatostomus temporalis (Grey-crowned Babbler)			
551. 552.		Pomatostomus temporalis subsp. rubeculus (Grey-crowned Babbler) Porzana fluminea (Australian Spotted Crake)			
553.		Prosopis pallida (Mesquite, Algaroba)	Υ		
554.		Protonibea diacanthus			
555.	-15745	Psammoperca waigiensis			
556.	-15179	Psettodes erumei			
557.		Pseudechis australis (Mulga Snake)			
558.		Pseudomys desertor (Desert Mouse)			
559. 560.		Pseudomys hermannsburgensis (Sandy Inland Mouse) Pseudonaja mengdeni (Western Brown Snake)			
561.		Pseudonaja modesta (Ringed Brown Snake)			
562.		Pseudonaja nuchalis (Gwardar, Northern Brown Snake)			
563.	-16788	Pseudorhombus argus			
564.	-14256	Pseudorhombus arsius			
565.	24390	Psophodes occidentalis (Western Wedgebill, Chiming Wedgebill)			
566.		Pterocaulon sphacelatum (Apple Bush)			
567.		Pterois antennata			
568. 569.		Pterois sp. Pterois volitans			
570.		Pteropus scapulatus (Little Red Flying-fox)			
571.		Ptilotula penicillatus (White-plumed Honeyeater)			
572.	2699	Ptilotus axillaris (Mat Mulla Mulla)			
573.	2738	Ptilotus latifolius (Tangled Mulla Mulla)			
574.		Ptilotus macrocephalus (Featherheads)			
575.		Ptilotus nobilis (Tall Mulla Mulla)			
576.		Ptilotus polystachyus (Prince of Wales Feather)			
577. 578.		Ptilotus villosiflorus Pygopus nigriceps			
576. 579.		Quoya loxocarpa			
580.		Quoya paniculata			
581.		Rachycentron canadum			
582.		Ramphotyphlops ammodytes			
583.		Ramphotyphlops grypus			
584.		Ramphotyphlops hamatus			
585.		Ramphotyphlops pilbarensis Pattus tuppovi (Palo Field-rat)			
586. 587.		Rattus tunneyi (Pale Field-rat) Recurvirostra novaehollandiae (Red-necked Avocet)			
557.	21110	1,100,100,110009			#4511 <u>/</u> 2 Ay124A







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
588.	. 11240	Rhagodia preissii subsp. obovata			
589.		Rhipidura leucophrys (Willie Wagtail)			
590.		Rhipidura phasiana (Mangrove Grey Fantail)			
591. 592.		Rhodanthe humboldtiana Rhodanthe psammophila			
593.		Rhynchoedura ornata (Western Beaked Gecko)			
594.		Rhynchosia minima (Rhynchosia)			
595.	. 12088	Rostellularia adscendens var. clementii			
596.	. 30434	Salsola australis			
597.	. 6484	Samolus repens (Creeping Brookweed)			
598.		Samolus sp. Millstream (M.I.H. Brooker 2076)			
599.		Santalum lanceolatum (Northern Sandalwood, Yarnguli)			
600. 601.		Sardinella albella			Υ
602.		Sardinella gibbosa Sargocentron praslin			
603.		Sargocentron rubrum			
604		Saurida nebulosa			
605.	. 4711	Sauropus trachyspermus			
606.	. 7595	Scaevola anchusifolia			
607.	. 7606	Scaevola crassifolia (Thick-leaved Fan-flower)			
608.	. 7608	Scaevola cunninghamii			
609.		Scaevola pulchella			
610.		Scaevola sericophylla			
611. 612.		Scaevola spinescens (Currant Bush, Maroon) Schenkia australis			
613.		Schoenoplectus dissachanthus			
614.		Schoenoplectus subulatus			
615.		Sclerolaena bicornis var. bicornis (Goathead Burr)			
616.	. 2633	Sclerolaena uniflora (Two-spined Saltbush)			
617.	15176	Scomberoides commersonnianus			
618.		Scomberoides lysan			
619.		Scomberoides lysan?			Υ
620.		Scomberoides tol			
621. 622.		Scomberomorus commerson Scomberomorus queenslandicus			
623		Scomberomorus semifasciatus			
624.		Selaroides leptolepis			
625.		Selenotoca multifasciata			
626	. 4196	Sesbania cannabina (Sesbania Pea)			
627.	. 4198	Sesbania formosa (White Dragon Tree)			
628.		Setaria verticillata (Whorled Pigeon Grass)	Υ		
629.		Sida rohlenae subsp. rohlenae			
630. 631.		Siganus fuscescens Sillago analis			
632.		Sillago burrus			
633.		Sillago ingenuua?			Υ
634		Sillago lutea			
635.	17601	Sillago sihama			
636.	. 25305	Simoselaps anomalus (Desert Banded Snake)			
637.		Smicrornis brevirostris (Weebill)			
638.		Sminthopsis macroura (Stripe-faced Dunnart)			
639. 640.		Sminthopsis youngsoni (Lesser Hairy-footed Dunnart) Solanum lasiophyllum (Flannel Bush, Mindjulu)			
641.		Sonchus oleraceus (Common Sowthistle)	Υ		
642		Sorghum plumosum (Plume Canegrass)	,		
643.		Sphyraena barracuda			
644.	. 625	Spinifex longifolius (Beach Spinifex)			
645.	. 633	Sporobolus mitchellii (Ratstail Couch)			
646.		Sporobolus virginicus (Marine Couch)			
647.		Stegostoma fasciatum Stemodio pp. Opology (A.A. Mitchell 76/149)			
648. 649.		Stemodia sp. Onslow (A.A. Mitchell 76/148) Sterna (albifrons) sinensis (White-shafted Little Tern, Little Tern)			
650.		Sterna (albinons) sinensis (writte-shalted Little Tern, Little Tern) Sterna bergii (Crested Tern)			
651.		Sterna nilotica (Gull-billed Tern)			
652		Stolephorus carpentariae			
653.		Stolephorus commersonii			
654.	. 8238	Streptoglossa liatroides			
655.		Streptoglossa macrocephala			
656.		Striga squamigera			
657.	14958	Strongylura strongylura		CHAIN	_
				67 643	







		Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
658.		Strophurus jeanae			
659.		Strophurus spinigerus subsp. spinigerus			
660. 661.		Strophurus strophurus Stylobasium spathulatum (Pebble Bush)			
662.		Suaeda arbusculoides			
663.		Suta punctata (Spotted Snake)			
664.		Swainsona pterostylis			
665.	-16279	Synanceia horrida			
666.	13339	Synaptantha tillaeacea var. tillaeacea			
667.	25705	Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
668.	24207	Tachyglossus aculeatus (Short-beaked Echidna)			
669.		Tadarida australis (White-striped Freetail-bat)			
670.		Taeniopygia guttata (Zebra Finch)			
671.		Tamopsis occidentalis			
672.		Tathicarpus butleri			
673.		Tecticornia halocnemoides (Shrubby Samphire)			
674. 675.		Tecticornia halocnemoides subsp. tenuis Tecticornia indica subsp. bidens			
676.		Tecticornia indica subsp. Islaens Tecticornia indica subsp. Islaens Tecticornia indica subsp. Islaens			
677.		Tephrosia rosea var. clementii			
678.		Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)			
679.		Tephrosia sp. Carnarvon (J.H. Ross 2681)			
680.		Tephrosia sp. Onslow (K.R. Newbey 10571)			
681.	-16492	Terapon jarbua			
682.	-14222	Terapon puta			
683.	-18073	Terapon thaeraps			Υ
684.	-14971	Terapon theraps			
685.		Threlkeldia diffusa (Coast Bonefruit)			
686.		Threskiornis spinicollis (Straw-necked Ibis)			
687.		Thryssa mystax?			
688.		Thryssa scratchleyi?			
689. 690.		Thryssa setirostris Tiliqua multifasciata (Central Blue-tongue)			
691.		Todiramphus chloris (Collared Kingfisher)			
692.		Todiramphus pyrrhopygius (Red-backed Kingfisher)			
693.		Todiramphus sanctus (Sacred Kingfisher)			
694.		Trachinotus baillonii			
695.	19053	Trachymene pilbarensis			
696.	-15661	Triacanthus biaculeatus			
697.	4377	Tribulus hirsutus			
698.		Tribulus hystrix			
699.		Tribulus occidentalis (Perennial Caltrop)			
700.		Trichodesma zeylanicum (Camel Bush, Kumbalin)			
701.		Trichodesma zeylanicum var. grandiflorum	.,		
702.		Tridax procumbens (Tridax)	Y		
703. 704.		Triglochin hexagona (Six-point Arrowgrass) Triodia epactia			
704. 705.		Triraphis mollis (Needle Grass)			
706.		Turnix velox (Little Button-quail)			
707.		Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)			
708.		Tyto alba (Barn Owl)			
709.		Udotea argentea			
710.	11321	Urochloa holosericea subsp. velutina			
711.	-13161	Urodacus varians			
712.	30716	Vachellia farnesiana (Mimosa Bush)	Υ		
713.		Varanus acanthurus (Spiny-tailed Monitor)			
714.		Varanus brevicauda (Short-tailed Pygmy Monitor)			
715.		Varanus caudolineatus			
716.		Varanus eremius (Pygmy Desert Monitor)			
717.		Varanus gouldii (Bungarra or Sand Monitor)			
718.		Varanus panoptes (Yellow-spotted Monitor)			
719. 720.		Varanus panoptes subsp. rubidus Varanus tristis (Racehorse Monitor)			
720. 721.		Verticordia forrestii (Forrest's Featherflower)			
721.		Vigna sp. Hamersley Clay (A.A. Mitchell PRP 113)			
723.		Vulpes vulpes (Red Fox)	Υ		
724.		Whiteochloa cymbiformis			
725.		Wydundra kennedy			
726.	-18129	Xyrichtys sp.			
727.	-15802	Yongeichthys nebulosus			







	Name ID Species Name		Naturalised	Conservation Code	¹ Endemic To Query Area
728.	-15439	Zabidius novemaculeatus			
729.	4847	Ziziphus mauritiana (Zornia)	Υ		
730.	25765	Zosterops lateralis (Grey-breasted White-eye, Silvereye)			
731.	24857	Zosterops luteus (Yellow White-eye)			

Conservation Codes

7 - 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 2
4 - Priority 4
5 - Priority 5

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







APPENDIX 3

Flora Inventory



APPENDIX 3: Flora Inventory

This list of flora species has been adapted from Biota (2010a) and ENV (2012a) and is a compilation of all species recorded for all flora surveys undertaken for the Study Area to date.

^{*} Denotes a weed species P Denotes a Priority species

Family		Species
ACANTHACEAE		Rostellularia adscendens var. clementii
		Trianthema glossostigma
		Trianthema pilosa
		Trianthema triquetra
		Trianthema turgidifolia
AMARANTHACEAE	*	Aerva javanica
		Alternanthera nana
		Alternanthera nodiflora
		Amaranthus mitchellii
		Gomphrena affinis subsp. pilbarensis
		Gomphrena cunninghamii
		Gomphrena sordida
		Hemichroa diandra
		Ptilotus appendiculatus var. appendiculatus
		Ptilotus arthrolasius
		Ptilotus astrolasius var. astrolasius
		Ptilotus axillaris
		Ptilotus exaltatus var. exaltatus
		Ptilotus fusiformis
		Ptilotus gomphrenoides
		Ptilotus gomphrenoides var. conglomeratus
		Ptilotus latifolius
		Ptilotus macrocephalus
		Ptilotus murrayi
		Ptilotus obovatus
		Ptilotus polystachyus var. polystachyus
		Ptilotus villosiflorus
ANTHERICACEAE		Corynotheca flexuosissima
		Corynotheca pungens
		Murchisonia volubilis
APIACEAE		Trachymene pilbarensis
APOCYNACEAE		Sarcostemma viminale subsp. australe
ASTERACEAE		Angianthus acrohyalinus
		Angianthus milnei
		Blumea tenella
		Brachyscome cheilocarpa
		Brachyscome ciliocarpa



Family		Species
		Brachyscome iberidifolia
		Calotis plumulifera
		Centipeda minima subsp. macrocephala
		Decazesia hecatocephala
	*	Flaveria trinervia
		Minuria cunninghamii
		Olearia dampieri subsp. dampieri
		Pluchea dentex
		Pluchea dunlopii
		Pluchea ferdinandi-muelleri
		Pluchea rubelliflora
		Pluchea sp. B Kimberly Flora (K.F.Kenneally 9526A)
		Pterocaulon sphacelatum
		Pterocaulon sphaeranthoides
		Rhodanthe floribunda
		Rhodanthe humboldtiana
		Rhodanthe stricta
		Streptoglossa adscendens
		Streptoglossa bubakii
		Streptoglossa decurrens
		Streptoglossa liatroides
		Streptoglossa macrocephala
		Streptoglossa odora
		Streptoglossa sp.
AVICENNIACEAE		Avicennia marina
		Avicennia marina subsp. Marina
BORAGINACEAE		Heliotropium crispatum
		Heliotropium curassavicum
		Heliotropium diversifolium
		Heliotropium inexplicitum
		Heliotropium ovalifolium
		Heliotropium pachyphyllum
		Heliotropium sp.
		Trichodesma zeylanicum var. grandiflorum
		Trichodesma zeylanicum var. zeylanicum
BRASSICACEAE		Lepidium pholidogynum
		Lepidium platypetalum
CAMPANULACEAE		Wahlenbergia tumidifructa
CARYOPHYLLACEAE		Polycarpaea corymbosa var. corymbosa
CHENOPODIACEAE		Atriplex amnicola
		Atriplex bunburyana
		Atriplex codonocarpa
		Atriplex semilunaris
		Dissocarpus paradoxus



Family	Species
	Dysphania Kalpari
	Dysphania plantaginella
	Dysphania platycarpa
	Dysphania rhadinostachya
	Enchylaena tomentosa var. tomentosa
	Maireana georgei
	Maireana lanosa
	Maireana planifolia
	Maireana sp.
	Maireana tomentosa
	Maireana tomentosa subsp. tomentosa
	Neobassia astrocarpa
	Rhagodia eremaea
	Rhagodia preissii subsp. obovata
	Salsola tragus
	Sclerolaena aff. parviflora
	Sclerolaena costata
	Sclerolaena cuneata
	Sclerolaena densiflora
	Sclerolaena glabra
	Sclerolaena recurvicuspis
	Sclerolaena uniflora
	Tecticornia ? auriculata
	Tecticornia ? halocnemoides subsp. tenuis
	Tecticornia ? sp. Dennys Crossing (K.A. Shepherd & J. English KS 552)
	Tecticornia auriculata
	Tecticornia doleiformis
	Tecticornia halocnemoides
	Tecticornia halocnemoides subsp. tenuis
	Tecticornia indica subsp. ? (intergrade between leiostachya/bidens/julacea)
	Tecticornia indica subsp. aff. bidens
	Tecticornia indica subsp. leiostachya
	Tecticornia pergranulata
	Tecticornia pergranulata subsp. elongata
	Tecticornia pergranulata subsp. pergranulata
	Tecticornia pruinosa
	Tecticornia pterygosperma subsp. denticulata
	Tecticornia sp.
	Tecticornia sp. (WH40-04) (T. halocnemoides completed)
	Tecticornia sp. (WHPH-15) (T. halocnemoides completed)
	Threlkeldia sp.
CLEOMACEAE	Cleome viscosa
	Cleome uncifera subsp. uncifera



Family		Species
CONVOLVULACEAE		Bonamia aff. linearis
		Bonamia erecta
		Bonamia linearis
		Bonamia rosea
		Convolvulus angustissimus subsp. angustissimus
		Cressa australis
		Evolvulus alsinoides var. decumbens
		Evolvulus alsinoides var. villosicalyx
		ipomoea coptica
		Ipomoea costata
		Ipomoea muelleri
		Ipomoea polymorpha
CUCURBITACEAE		Cucumis maderaspatanus
	*	Cucumis melo subsp. agrestis
CYPERACEAE		Cyperus bulbosus
		Cyperus iria
		Cyperus rigidellus
		Cyperus squarrosus
	P3/VU	Eleocharis papillosa
		Fimbristylis dichotoma
		Fimbristylis rara
		Schoenoplectus dissachanthus
ELATINACEAE		Bergia pedicellaris
		Bergia perennis
		Bergia perennis subsp. exigua
		Bergia perennis subsp. perennis
		Bergia trimera
EUPHORBIACEAE		Adriana tomentosa var. tomentosa
		Euphorbia aff. coghlanii
		Euphorbia alsiniflora
		Euphorbia australis
		Euphorbia australis (mid-green form)
		Euphorbia biconvexa
		Euphorbia boophthona
		Euphorbia coghlanii
		Euphorbia drummondii subsp. drummondii
		Euphorbia myrtoides
		Euphorbia sharkoensis
		Euphorbia tannensis subsp. eremophila
		Euphorbia wheeleri
		Phyllanthus erwinii
		Phyllanthus maderaspatensis
FABACEAE		Acacia ancistrocarpa
		Acacia bivenosa



Family	Species
	Acacia colei var. colei
	Acacia coriacea subsp. coriacea
	Acacia coriacea subsp. pendens
	Acacia inaequilatera
	Acacia ligulata
	Acacia pyrifolia
	Acacia rostellifera
	Acacia sclerosperma
	Acacia sclerosperma hybrid
	Acacia sclerosperma subsp. sclerosperma
	Acacia sericophylla
	Acacia sphaerostachya
	Acacia stellaticeps
	Acacia synchronicia
	Acacia tetragonophylla
	Acacia trachycarpa
	Acacia trudgeniana
	Acacia tumida var. pilbarensis
	Acacia victoriae
	Acacia wanyu
	Acacia xiphophylla
	Aenictophyton aff. reconditum subsp. Onslow
	Aeschynomene indica
	Alysicarpus muelleri
	Canavalia rosea
	Crotalaria cunninghamii subsp. sturtii
	Crotalaria medicaginea var. neglecta
	Crotalaria ramosissima
	Crotalaria sp.
	Cullen cinereum
	Cullen graveolens
	Cullen lachnostachys
	Cullen leucanthum
	Cullen leucanthum (Cape Preston form; M59.9)
	Cullen leucochaites
	Cullen martinii
	Cullen pogonocarpum
	Desmodium filiforme
	Indigofera boviperda subsp. boviperda
	Indigofera colutea
	Indigofera georgei
	Indigofera linifolia
	Indigofera linnaei
	Indigofera monophylla



Family		Species
		Indigofera monophylla (Burrup form)
		Indigofera trita
		Isotropis atropurpurea
		Lotus cruentus
		Neptunia dimorphantha
	*	Petalostylis cassioides
	*	Prosopis glandulosa
	*	Prosopis pallida
		Rhynchosia minima
		Senna aff. oligophylla (thinly sericeous) x helmsii
		Senna artemisioides
		Senna artemisioides subsp. oligophylla
		Senna glutinosa
		Senna glutinosa x luerssenii
		Senna luerssenii
		Senna notabilis
		Senna oligophylla
		Senna oligophylla (thinly sericeous MET 15,035)
		Senna oligophylla x helmsii
		Senna pruinosa
		Sesbania cannabina
		Swainsona kingii
		Swainsona pterostylis
		Tephrosia aff. supina (HD133-20)
		Tephrosia aff. supina (MET 12,357)
		Tephrosia gardneri
		Tephrosia remotiflora
		Tephrosia rosea var. clementii
		Tephrosia sp. B Kimberley Flora (C.A.Gardner 7300)
		Tephrosia supina
		Tephrosia uniovulata
	*	Vachellia farnesiana
		Vigna lanceolata
	P2	Vigna sp. central (M.E. Trudgen 1626)
		Vigna sp. Hamersley Clay (A.A. Mithcell PRP 113)
FRANKENIACEAE		Frankenia ambita
		Frankenia pauciflora
GENTIANACEAE		Centaurium clementii
		Centaurium spicatum
GERANIACEAE		Erodium cygnorum
GOODENIACEAE		Goodenia forrestii
		Goodenia lamprosperma
		Goodenia microptera
		Scaevola cunninghamii



Family	Species
	Scaevola pulchella
	Scaevola sericophylla
	Scaevola spinescens
	Scaevola spinescens (broad form)
GYROSTEMONACEAE	Codonocarpus cotinifolius
	Gyrostemon ramulosus
HALORAGACEAE	Haloragis gossei var. gossei
	Haloragis gossei var. inflata
HEMEROCALLIDACEAE	Tricoryne corynothecoides
LAMIACEAE	Dicrastylis cordifolia
	Pityrodia loxocarpa
	Pityrodia paniculata
LAURACEAE	Cassytha aurea var. aurea
	Cassytha capillaris
LYTHRACEAE	Rotala diandra
MALVACEAE	Abutilon aff. lepidum (1) (MET 15 352)
	Abutilon aff. lepidum (4)
	Abutilon cunninghamii
	Abutilon dioicum
	Abutilon fraseri
	Abutilon lepidum
	Abutilon otocarpum
	Abutilon otocarpum (acute leaf form)
	Abutilon oxycarpum subsp. prostratum
	Abutilon sp.
	Abutilon uncinatum
	Alyogyne pinoniana
	Corchorus tectus
	Gossypium australe (Burrup Peninsula form)
	Hannafordia quadrivalvis subsp. recurva
	Hibiscus brachychlaenus
	Hibiscus brachysiphonius
	Hibiscus leptocladus
	Hibiscus sturtii var. campylochlamys
	Hibiscus sturtii var. platychlamys
	Lawrencia viridigrisea
*	Malvastrum americanum
	Sida aff. fibulifera
	Sida aff. fibulifera (B64-13B)
	Sida aff. fibulifera (M69.12)
	Sida arsiniata
	Sida echinocarpa
	Sida pilbarensis (ferruginous form)
	Sida rohlenae subsp. rohlenae



Family		Species		
	P3	Triumfetta echinata Halford		
MARSILEACEAE	†	Marsilea drummondii		
	†	Marsilea exarata		
		Marsilea hirsuta		
MELIACEAE		Owenia reticulata		
MENISPERMACEAE	1	Tinospora smilacina		
MOLLUGINACEAE		Mollugo molluginea		
MYRTACEAE		Corymbia candida		
	1	Corymbia hamersleyana		
		Corymbia zygophylla		
		Eucalyptus camaldulensis var. obtusa		
		Eucalyptus victrix		
		Eucalyptus xerothermica		
		Melaleuca argentea		
		Melaleuca glomerata		
		Verticordia forrestii		
NYCTAGINACEAE		Boerhavia burbidgeana		
		Boerhavia coccinea		
PASSIFLORACEAE	*	Passiflora foetida var. hispida		
PHRYMACEAE		Mimulus gracilis		
		Mimulus uvedaliae		
		Peplidium aithocheilum		
PLANTAGINACEAE		Stemodia grossa		
		Stemodia sp. Onslow (A.A. Mithcell 76/148)		
PLUMBAGINACEAE		Muellerolimon salicorniaceum		
POACEAE		Aristida contorta		
		Aristida holathera var. holathera		
		Aristida holathera var. latifolia		
		Aristida latifolia		
		Astrebla elymoides		
		Astrebla pectinata		
		Brachyachne convergens		
		Brachyachne prostrata		
	*	Cenchrus ciliaris		
	*	Cenchrus setiger		
		Chloris pectinata		
		Chloris pumilio		
		Chrysopogon fallax		
		Cymbopogon ambiguus		
		Cymbopogon obtectus		
		Cymbopogon procerus		
		Dactyloctenium radulans		
		Dichanthium sericeum subsp. humilius		
		Digitaria brownii		



Family	Species
-	Enneapogon caerulescens
	Enneapogon polyphyllus
	Enteropogon ramosus
	Eragrostis aff. falcata
	Eragrostis aff. setifolia
	Eragrostis cumingii
	Eragrostis dielsii
	Eragrostis eriopoda
	Eragrostis falcata
	Eragrostis leptocarpa
	Eragrostis pergracilis
	Eragrostis tenellula
	Eragrostis xerophila
	Eriachne aff. benthamii
	Eriachne aristidea
	Eriachne benthamii
	Eriachne gardneri
	Eriachne helmsii
	Eriachne mucronata
	Eriachne obtusa
	Eriachne pulchella subsp. dominii
	Eriochloa pseudoacrotricha
	Eulalia aurea
	Iseilema dolichotrichum
	Iseilema eremaeum
	Iseilema macratherum
	Iseilema membranaceum
	Leptochloa digitata
	Leptochloa fusca subsp. muelleri
	Panicum decompositum
	Panicum laevinode
	Paraneurachne muelleri
	Paspalidium clementii
	Setaria dielsii
	Setaria verticillata
	Sorghum plumosum
	Spinifex longifolius
	Sporobolus australasicus
	Sporobolus mitchellii
	Sporobolus virginicus
	Triodia brizoides
	Triodia epactia
	Triodia lanigera
	Triodia pungens



Family		Species
· •,		Triodia schinzii
		Tripogon loliiformis
		Triraphis mollis
		Urochloa holosericea subsp. velutina
		Urochloa occidentalis var. occidentalis
		Urochloa piligera
		Whiteochloa airoides
		Yakirra australiensis var. australiensis
POLYGALACEAE		Polygala aff. isingii
TOLIGALACIAL		Polygala isingii
PORTULACACEAE		Calandrinia ptychosperma
TORTOLAGACLAL	*	Portulaca oleracea
		Portulaca pilosa
PRIMULACEAE		Samolus sp. Millstream (M.I.H. Brooker 2076)
TRIWOLACEAE		Samolus sp. Shark Bay (M.E. Trudgen 7410)
PROTEACEAE		Grevillea eriostachya
FROTLACEAL		Grevillea stenobotrya
		Grevillea wickhamii subsp. hispidula
		Hakea lorea subsp. lorea
		·
RHIZOPHORACEAE		Hakea stenophylla subsp. stenophylla Ceriops tagal
RUBIACEAE		Synaptantha tillaeacea var. tillaeacea
SANTALACEAE		Santalum lanceolatum
SAPINDACEAE		Diplopeltis eriocarpa
SCROPHULARIACEAE		Eremophila cuneifolia
GCROFFIOLARIAGEAE		Eremophila forrestii subsp. forrestii
	P3	Eremophila forrestii subsp. viridis
	F3	Eremophila longifolia
		Myoporum montanum
SOLANACEAE		Nicotiana occidentalis
GOLANACLAL		Nicotiana occidentalis Nicotiana occidentalis subsp. occidentalis
		Nicotiana rosulata subsp. rosulata
		Nicotiana sp.
		Solanum diversiflorum
		Solanum ellipticum
		Solanum horridum
		Solanum lasiophyllum Solanum phlomoides
		Solanum sturtianum
STACKHOUSIACEAE		Stackhousia muricata
STERCULIACEAE		
STERGULIAGEAE		Melhania oblongifolia Waltheria indica
SURIANACEAE		
		Stylobasium spathulatum Pimelea ammocharis
THYMELAEACEAE		ririlelea ammocharis



Family	Species
TILIACEAE	Corchorus aff. laniflorus
	Corchorus sidoides subsp. vermicularis
	Corchorus tridens
	Triumfetta aff. chaetocarpa (H123-10)
	Triumfetta aff. chaetocarpa (PAN3/4)
	Triumfetta clementii
	Triumfetta echinata
	Triumfetta sp.
VIOLACEAE	Hybanthus aurantiacus
ZYGOPHYLLACEAE	Tribulus astrocarpus
	Tribulus hirsutus
	Tribulus hystrix
	Tribulus macrocarpus
	Tribulus occidentalis



APPENDIX 3

Terrestrial Fauna Review: Ashburton North Strategic Industrial Area



TERRESTRIAL FAUNA REVIEW

Ashburton North Strategic Industrial Area













TERRESTRIAL FAUNA REVIEW

Ashburton North Strategic Industrial Area

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Figure 6:

APPENDIX 1: Priority Codes and Categories of Threatened Species

APPENDIX 2: Results of Database Searches

APPENDIX 3: Fauna List



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1.0 INTRODUCTION

I.I Background

LandCorp is preparing an Improvement Plan for the Ashburton North Strategic Industrial Area (ANSIA), to provide an effective planning framework for the future. The ANSIA Improvement Plan Area is located 10 kilometres (km) south-west of Onslow in the Shire of Ashburton (Figure 1).

The purpose of the Improvement Plan is to establish a framework for land use coordination and infrastructure delivery through highlighting the provisions that will be required within an Improvement Scheme and Guide Plan. Improvement Plan will need to ensure sufficient guidance is included in order to ensure the development of an Improvement Scheme and Guide plan, which includes the following:

- streamlining of the approval process
- reducing the layer of planning required
- avoiding duplication and inconsistencies in requirements / planning provisions
- ensuring projects of state significance are appropriately considered
- ensuring local planning is not neglected or adversely impacted by development.

To inform an appropriate approach to the development of the Improvement Plan and Scheme for the ANSIA, a thorough understanding of the context, broader influences and provisions of existing documentation that may impact the project is required. This includes key environmental aspects such as flora and vegetation and fauna.

The recommended Improvement Plan boundary is based on the inclusion of the ANSIA Structure Plan area, the future expansion area to the east towards Onslow Road and an appropriate buffer to preserve the integrity of the ANSIA (Figure A).



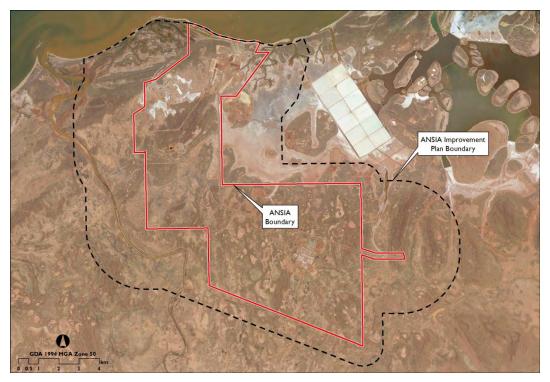


Figure A: Existing ANSIA and Proposed Improvement Plan Boundaries

I.I.I Previous Environmental Approvals

Since 2008, a raft of documentation has been prepared in order to establish and further develop the ANSIA for the purposes of providing a strategic industrial area which is suitable for hydrocarbon processing industries and support facilities, promoting the common use of infrastructure and industrial synergies. The framework has developed incrementally in order to reflect the varying timeframes associated with the establishment of the gas plants. To date the current planning has produced:

- scheme amendments to the Shire of Ashburton Local Planning Scheme 7 to facilitate the rezoning of the land from "Rural" to "Strategic Industrial", "Industrial" and "Special Use" zones
- ANSIA Structure Plan and Stage IB and IC Development Plan which provides the framework for the development of Stage I, including stages
 - Wheatstone LNG Plant and Common User Coastal Area/Port and Multi User Infrastructure Access Corridors, and the Wheatstone Transient Workforce Accommodation, and second Transient Workers Accommodation Site
 - Macedon Gas Plant and Scarborough Gas Plant
 - future industrial area
 - general industrial area



 both the Macedon gas pipeline and the Wheatstone LNG plant were subject to a formal environmental assessment.

The above structure plans and development approvals were subject to comprehensive flora and vegetation surveys and environmental reporting.

1.1.2 Industrial Development within the ANSIA

Industrial development proposed within the ANSIA is separated into either Heavy or General Industry land uses. Figure B shows these land uses in the context of the ANSIA.

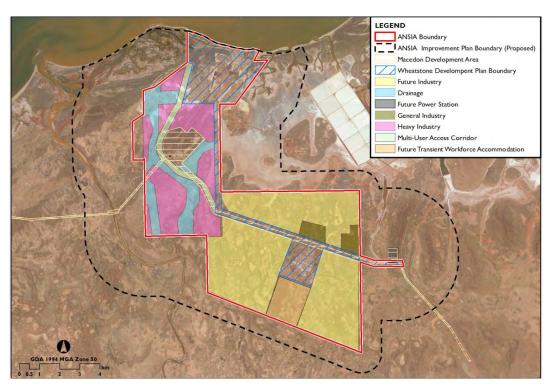


Figure B: Industrial Land Uses within the ANSIA

1.1.2.1 Buffers

The overall aim of the Strategic Industrial Area Buffer is to ensure that no sensitive receptors as defined by the State Industrial Buffer Policies are located within proximity to the ANSIA. The external buffers from the industrial land uses have been established with regard to the following planning and environmental criteria:

- Noise at sensitive land uses being 35dB(A)
- Risk at a risk level of one in a million per year or less
- Air Quality.

The ANSIA also accommodates internal buffers from sensitive land uses such as the Temporary Workers Accommodation (TWA). The ANSIA external and internal buffers are depicted in Figure C.



This outcome will deliver "islands" of individual industrial land uses within the ANSIA landscape.

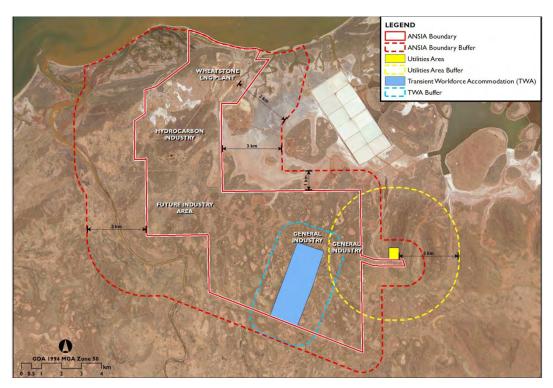


Figure C: ANSIA Internal and External Buffers

1.2 Terrestrial Fauna Review

1.2.1 Purpose of this Review

The purpose of this report is to provide an assessment of the conservation significant terrestrial fauna and associated habitats identified as occurring or considered likely to occur within the ANSIA Improvement Plan Area.

1.2.2 Scope of Works

The scope of work addressed by this review comprises:

- Review relevant environmental legislation and associated regulations including
 - Wildlife Conservation Act 1950 (Western Australia) (WC Act)
 - Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)
 (EPBC Act).
- Conduct a desktop review of the existing environment including
 - a description of fauna habitats within the ANSIA Improvement Plan Area



 identification of terrestrial fauna identified as occurring or considered likely to occur within the ANSIA Improvement Plan Area that may potentially be impacted by future development of the site, with a focus on species that are listed under the WC Act and the EPBC Act.



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2.0 LEGISLATIVE CONTEXT

2.1 Wildlife Conservation Act 1950

The objective of the WC Act (Western Australia) is to provide for the conservation and protection of wildlife. Under the WC Act, fauna recognised as being threatened or particularly vulnerable may be listed under the Act as Specially Protected Fauna. The WC Act is administered by the Director General of the Department of Parks and Wildlife (DPaW) under the direction and control of the Minister for the Environment.

The WC Act provides protection for native terrestrial fauna that are under identifiable threat of extinction, are rare, or otherwise in need of special protection (DPaW 2013a).

The WC Act affords four levels of protection:

•	Schedule I	being fauna that is rare or likely to become extinct, are declared
		to be fauna that is in need of special protection.

- Schedule 2 being fauna that is presumed to be extinct, are declared to be fauna that is in need of special protection.
- Schedule 3 being birds that are subject to an agreement between the government of Australia and the governments of Japan, China andthe Republic of Korea relating to the protection of migratory birds, are declared fauna that is in need of special protection.
- Schedule 4 is declared fauna that is in need of special protection, otherwise than for the reasons mentioned above.

In addition to the four levels of protection described above, DPaW maintains a list of priority fauna for Western Australia that includes species that do not meet the criteria to be listed as Specially Protected Fauna, but may be considered at risk. Priority listed taxa are not protected under the WC Act. The priority lists are used to assist DPaW in considering which fauna are most in need of further investigation to establish their status in the wild. Definitions of the Priority codes are provided in Appendix I (DPaW 2013b).

2.2 Environment Protection and Biodiversity Conservation Act 1999

In addition to the WC Act, terrestrial fauna species that are recognised as being threatened or particularly vulnerable may be protected under the Commonwealth EPBC Act. The EPBC Act is administered by the Department of the Environment (DotE). The objectives of the EPBC Act are to:

 Provide for the protection of the environment, especially Matters of National Environmental Significance (MNES).



- Conserve Australian biodiversity.
- Provide a streamlined national environmental assessment and approvals process.
- Enhance the protection and management of important natural and cultural places.
- Control the international movement of plants and animals (wildlife), wildlife specimens and products made or derived from wildlife.
- Promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources (DotE n.d.).

The EPBC Act protects MNES, with state legislation providing for the protection of matters of state and local significance. MNES that relate to terrestrial fauna potentially impacted by future development within the ANSIA Improvement Plan Area are:

- listed threatened species (Vulnerable, Endangered, Critically Endangered and Extinct in the Wild)
- migratory species protected under international agreements.

2.3 Environmental Protection Act 1986

The Environmental Protection Act 1986 (Western Australia) (EP Act) is the principal legislation which provides for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment. The EP Act is administered by the Environmental Protection Authority (EPA).

Activities that may impact upon the environment within the jurisdiction of Western Australia are recommended to be referred to the EPA for assessment under the EP Act. Unlike the WC Act or the EPBC Act, the EP Act does not specifically protect individual fauna species. However, the EPA does provide guidance on environmental factors that are assessed under the EP Act, one of which is terrestrial fauna. The EPA's objective in relation to this environment factor is:

To maintain the representation, diversity, viability and ecological function at the species, population and assemblage level.

(EPA 2013)

RPS expects that LandCorp will refer the proposed strategic industrial area to the EPA for assessment under the EP Act. As such, the information provided by this review may be of use in assessing potential impacts of the ANSIA Improvement Scheme and Guide Plan in relation to the EPA's terrestrial fauna objective.



3.0 METHODOLOGY

3.1 Desktop Assessment

3.1.1 Historical Regional Surveys and Mapping

The following regional land surveys and mapping datasets relating to the ANSIA Improvement Plan Area were reviewed to provide a regional context in which to assess fauna values:

- Interim Biogeographical Regionalisation of Australia (IBRA) biological subregions within Australia (Environment Australia 2000; Kendrick and Mau 2002)
- Land Systems (Payne et al. 1988).

3.1.2 Database Searches

Database searches were conducted to determine a list of conservation significant terrestrial fauna (i.e. those protected under the WC Act and / or the EPBC Act, or considered Priority species by DPaW) that may occur within the site. The databases searched and the corresponding search areas are provided in Table I. The results of the database searches are provided in Appendix 2.

Table I: Fauna Databases Searched and Corresponding Search Areas

Database Name	Administering Organisation	Search Area Defined	
NatureMap Database	DPaW	Circle search within a 15 km radius of 115°01'05"E and 21°45'06"S.	
Threatened and Priority Fauna Database	DPaW	Circle search within a 20 km radius of 115°01'05"E and 21°45'06"S.	
Protected Matters Search Tool	DotE	Circle search within a 15 km radius of -115.018'33"E, -21.751'93"S	
Species Profile and Threats Database	DotE	Search conducted by species, not area.	

3.1.3 Literature Review

A review of recent environmental reports detailing the natural environment and terrestrial fauna species for Onslow supplemented the database searches. The following reports were reviewed to inform this Terrestrial Fauna Review:

- Wheatstone Project Terrestrial Fauna Survey (Biota Environmental Sciences (Biota) 2010a)
- Wheatstone Project Flora and Fauna Assessment Addendum (Biota 2010b)



- Wheatstone Project ClayPan Ephemeral Fauna Survey (Biota 2010c)
- Wheatstone Project Subterranean Fauna Assessment (Biota 2010d)
- Survey for Migratory Waterbirds in the Wheatstone LNG Project Area, November 2008 and March 2009 (Bamford Consulting Ecologists (Bamford) 2009a)
- Fauna Assessment BHP Billiton Petroleum Pty Ltd Macedon Gas Development Terrestrial Plant Site and Linear Infrastructure Corridor (Bamford 2009b)
- Ashburton North Strategic Industrial Area Biological Desktop Review (ENV 2012a)
- Ashburton North Strategic Industrial Area Fauna Assessment (ENV 2012b)
- Desktop Review of the Proposed Onslow Micro-Siting Survey Area (Biota 2013)
- Marine Turtle Beach Survey, Onslow Mainland Areas and Nearby Islands, 25
 January 6 February 2009 (Pendoley Environmental 2009).

Figure I displays the project areas for these previous studies relative to the ANSIA Improvement Plan Area.



4.0 TERRESTRIAL HABITATS

4.1 Interim Biogeographical Regionalisation of Australia

The IBRA currently recognises 89 bioregions and 419 biological subregions within Australia. The ANSIA Improvement Plan Area lies within the Cape Range CARI subregion of the Carnarvon region (Environment Australia 2000).

4.1.1 Carnarvon Region (Cape Range Subregion)

The Cape Range CARI subregion is 2,547,911 ha in size and is described by Kendrick and Mau (2002) as:

Cape Range and Giardia dune fields form the northern part of Carnarvon Basin. Rugged tertiary limestone and extensive areas of red aeolian dunefield, Quaternary coastal beach dunes and mud flats. Acacia shrublands over Triodia on limestone (Acacia stuartii or A. bivenosa) and red dune fields, Triodia hummock grasslands with sparse Eucalyptus trees and shrubs on the Cape Range. Extensive hummock grasslands (Triodia) on the Cape Range and eastern dune-fields. Tidal mudflats of sheltered embayments of Exmouth Gulf support extensive mangroves. Beach dunes with Spinifex communities. An extensive mosaic of saline alluvial plains with samphire and saltbush low shrublands along the eastern hinterland of Exmouth Gulf. Islands of the Muiron, Barrow, Lowendal and Montebello groups are limestone-based.

4.1.2 Conservation Reserves

The Carnarvon IBRA bioregion has only 3.45% represented in conservation reserve (IUCN I-IV). At a subregional level Cape Range CARI has 2.2% in reserve (Kendrick and Mau 2002). CARI reserves include:

- Cape Range National Park
- Ningaloo Marine Park
- Bundegi Conservation Park
- Jurabi Conservation Park
- Barrow Island Nature Reserve.

The ANSIA Improvement Plan Area does not contain any conservation reserves with the closest protected areas to the ANSIA Improvement Plan Area being the Cane River Conservation Park (approximately 147,881 ha in extent) located approximately 41 km to the south-east of the site (Figure 2).



4.2 Land Systems

Land system mapping of the rangelands by the Department of Agriculture and Food, Western Australia and Department of Land and Surveys defines a map unit or land system as "an area or group of areas throughout which there is a recurring pattern of topography, soils and vegetation". The area was mapped at a scale of 1:250,000 and Payne et al. (1988) identified the following broad land systems that coincide within the ANSIA Improvement Plan Area (Figure 3):

- Dune: dune fields supporting soft spinifex grassland
- Littoral: Bare coastal mudflats with mangroves on seaward fringes, samphire flats, sandy islands, coastal dunes and beaches
- Onslow: Undulating sandplains, dunes and level clay plains supporting soft spinifex grasslands and minor tussock grasslands
- Minderoo: Alluvial plains supporting tall shrublands and tussock grasslands and sandy plains supporting hummock grasslands
- Giralia: Linear dunes and broad sandy plains supporting hard and sift spinifex.

4.2.1 Habitat Types

Biota (2010a; 2010b; 2013) identifies that the following broad fauna habitats occur within the Wheatstone project area, addendum area and micro-siting area which accord with the ANSIA Improvement Plan Area:

- Primary Dune: Spinifex and Triodia grassland and Buffel tussock on primary dune
- Inland Dune: Triodia epatica dominated hummock grassland on inland dunes system
- Sand/Loam Plain: Acacia sp. over Triodia epatica hummock grassland on sand / loam plain
- Buffel on Clay: Acacia sp. over buffel tussock grassland on clay plain
- Samphire: Samphire Clay Plan
- Tussock on Clay: Tussock grassland on clay plain
- Drainage: Eucalyptus sp. and Buffel tussock on dominated drainage lines.



Biota (2010b; 2013) noted that no new or substantially different habitats were identified in the Wheatstone addendum area or mirco-siting area when compared to the Wheatstone project area. Informed by the findings of additional fauna surveys undertaken by Bamford (Bamford 2009a; Bamford 2009b) and Biota (Biota 2010c; 2010d) it is considered that the fauna habitat assessments over the various project areas are applicable to the unsurvey portions of the ANSIA Improvement Plan Area.



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5.0 CONSERVATION SIGNIFICANT FAUNA

5.1 Previous Fauna Assessments of Vertebrate Fauna

The Level 2 fauna survey undertaken by Biota (2010a) identified combined total of 128 vertebrate species, comprising 51 herpetofauna species, 60 avifauna species and 17 mammals. Due to the proximity of the Wheatstone addendum area (Biota 2010b) and the micro-siting area (Biota 2013) and that these areas contained the same habitat types, the assemblage of vertebrate fauna identified by Biota (2010a) was considered to be representative of these areas. The site inspection and targeted survey undertaken by Bamford (2009b) recorded nine reptile species, 52 avifauna species and two mammals.

5.2 Desktop Fauna Review

For the purpose of this review, conservation significant fauna are those species protected under the WC Act and / or the EPBC Act and those listed as priority species by DPaW. Note a species may be listed under multiple conservation categories (e.g. a species may be listed as threatened and migratory). A summary of conservation significant fauna identified by the database searches is provided in Table 2. A complete list of conservation significant fauna species potentially occurring near the ANSIA Improvement Plan Area is provided in Appendix 3.

Table 2: Fauna identified by Database Searches as potentially occurring near the ANSIA Improvement Plan Area

Taxon	Threatened Species* [†]	Migratory Species [†]	Specially Protected Species*	Priority Species
Reptiles	2	0		1
Bird	10	31	1	4
Mammals	2			3
Total	14	31	1	8

*Protected under the WC Act †Protected under the EPBC Act

The following sections review the conservation significant fauna species identified as potentially occurring near the ANSIA Improvement Plan Area and provides an assessment of the likelihood of significant impacts occurring to these species because of developing the site for industrial purposes. Due to similar habitat requirements and the detail of previous surveys undertaken for migratory birds relating to the ANSIA Improvement Plan Area and, more generally to the Onslow region, for the purpose of this review migratory birds have been treated as an assemblage of species rather than specific individuals. Additionally, where species have been identified in Appendix 3 but are not expected to occur near the ANSIA Improvement Plan Area, such as the keeled slider or the western barred bandicoot, these species have not been assessed by this review.



5.3 Threatened Species

5.3.1 Reptiles

Two species of threatened reptiles were identified as potentially occurring near the ANSIA Improvement Plan Area (Appendix 3).

5.3.1.1 Airlie Island Skink

The Airlie Island skink is known from approximately 12 locations in north-west Western Australia: Airlie Island (offshore from Onslow), Thangoo Station (Roebuck Bay), Pretty Pool and Wedgefield (Port Hedland), Redbank (Port Hedland), Finucane Island (Port Hedland), Beebingarra Creek, Roebuck (Crab Creek), Cape Keraudren (Pardoo), Port Smith (Lagrange), Willie Creek (Broome), Boodarie Station and Karratha. On the mainland, the Airlie Island skink is known to inhabit the landward fringe of salt marsh communities in samphire shrubland or marine couch grassland in the intertidal zone along mangrove margins. This species is strongly associated with samphire species, *Tectornia halocnemoides* subsp. *tenuis* and *Suaeda arbusculoides*, which occur on clayey soils, and mixed herb and grass cover of *Muellerolimon salicorniaceum* and *Sporobolus virginicus*, which occur on sandy soils (DotE 2014a).

Given the known locations of the Airlie Island skink and that it was not detected by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010a; Bamford 2009b) it is considered likely that this species is locally absent from the site.

5.3.1.2 <u>Pilbara Olive Python</u>

The Pilbara olive python is common and wide-spread in the Pilbara and has been identified as a species that should not be listed as threatened or declining (Kendrick and Stanley 2001). Pilbara olive pythons are most often seen at night and are generally found around rocky areas, rocky outcrops and cliffs, particularly in the vicinity of watercourses and water holes, but are also known to shelter in logs, flood debris, caves, tree hollows and thick vegetation (Burbidge 2004).

The DPaW search results identify that the Pilbara olive python has been recorded in the vicinity of the Wheatstone project area once in 2012. This species was not detected by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010a; Bamford 2009b). Given the large area of suitable habitat available for this species surrounding the ANSIA Improvement Plan Area, and the isolated nature of development proposed within the site, the risk of significant impact occurring to the Pilbara olive python resulting from the development of the site for industrial purposes is considered low.



5.3.2 Birds

Nine species of threatened birds were identified as potentially occurring near the ANSIA Improvement Plan Area (Appendix 3).

5.3.2.1 Red Knot (North-eastern Siberia)

This red knot breeds in north-east Siberia, including the Chukotskiy Peninsula, and possibly areas farther west, and winters in Australia. The red knot is common in all the main suitable habitats around the coast of Australia, but is less numerous in south-west Australia than elsewhere. Very large numbers are regularly recorded in north-west Australia, with 80 Mile Beach and Roebuck Bay being particular strongholds. Red knots mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater or inland lakes or swamps (DotE 2014c).

This species has been recorded once by the DPaW search results at the Ashburton River mouth in 1980. This species was not recorded by surveys undertaken by either Biota (2010a) or Bamford (2009a; 2009b) and it is therefore considered unlikely to be significantly impacted because of developing the ANSIA Improvement Plan Area for industrial purposes.

5.3.2.2 <u>Curlew Sandpiper</u>

The curlew sandpiper breeds in north Siberia and winters from western Africa to Australia. In Australia, curlew sandpipers occur around the coasts and are quite widespread inland, though in smaller numbers. Records occur in all states during the non-breeding period, and during the breeding season when many non-breeding one-year old birds remain in Australia rather than migrating north. Curlew sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and around non-tidal swamps, lakes and lagoons near the coast, and ponds in salt works and sewage farms (DotE 2014d).

This species has been recorded by twice by the DPaW search results in the vicinity of Onslow in 1999 and was detected at Onslow by Bamford (2009a). The curlew sandpiper not recorded within either the Wheatstone or the Macedon project areas by either Biota (2010a) or Bamford (2009a; 2009b). Given that this species has not been recorded within the ANSIA Improvement Plan Area and the large area of suitable habitat available for this species in the Pilbara the risk of significant impact occurring to the curlew sandpiper because of developing the site for industrial purposes is considered low.



5.3.2.3 Great knot

The great knot breeds in north-east Siberia and winters along coastal areas. It feeds on bivalves, gastropods, crustaceans and other invertebrates it finds in shallow coastal waters (DotE 2014e).

Bamford (2009a) recorded this species along the Onslow coast and the Ashburton River in low numbers (maximum count of five individuals). This species has also previously been recorded in low numbers (nine individuals) at Dampier saltworks, which are east of the ANSIA Improvement Plan Area by Bamford. Although this species is known to occur in in coastal and riverine habitats in low numbers the vicinity of the site, it is considered unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area due to a lack of habitat. The risk of significant impact occurring to the great knot as a result of developing the site for industrial purposes is considered to be low.

5.3.2.4 Greater Sand Plover (Mongolian)

This greater sand plover breeds in the northern parts of the Gobi Desert in Mongolia and in north-western China, and winters in Australasia and South-east Asia. In Australasia, the species is almost entirely coastal, inhabiting littoral and estuarine habitats. Greater sand plovers mainly occur on sheltered sandy, shelly or muddy beaches with large intertidal mudflats or sandbanks, as well as sandy estuarine lagoons and seldom occur at shallow freshwater wetlands (DotE 2014f).

This sub-species has been recorded once in the DPaW search results in Onslow in 1900. This sub-species was not recorded within either the Wheatstone or the Macedon project areas by either Biota (2010a) or Bamford (2009a; 2009b). Common greater sand plovers (*Charadrius leschenaultii*) were recorded in low numbers adjacent to the site along the coastline and riverine areas (with a maximum count of 23 individuals at Town Beach in Onslow). It is considered that greater sand plover (Mongolian) is unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area, therefore the risk of significant impact occurring to this subspecies because of developing the site is considered low.

5.3.2.5 <u>Lesser Sand Plover</u>

The lesser sand plover breeds in Mongolia and Russia and it winters from Taiwan to Australasia. In Australia, this species is widespread in coastal regions, and has been recorded in all states. The lesser sand plover mainly occurs in northern and eastern Australia, in south-eastern parts of the Gulf of Carpentaria, western Cape York Peninsula and islands in Torres Strait, and along the entire east coast, though it occasionally also occurs inland. This species usually occurs in coastal littoral and estuarine environments. It inhabits large intertidal sand flats or mudflats in sheltered bays, harbours and estuaries, and occasionally sandy ocean beaches, coral reefs, wavecut rock platforms and rocky outcrops. It also sometime occurs in short saltmarsh or among mangroves (DotE 2014g).



This species was recorded at Town Beach in Onslow by Biota (2010a) and Bamford (2009a) with maximum count of six individuals and has not been recorded elsewhere along the coastline. Given that the Lesser sand plover has only been recorded in the coastal environment at Town Beach, it is considered unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area. Therefore the risk of significant impact occurring to the Lesser sand plover as a result of developing the site for industrial purposes is considered to be low.

5.3.2.6 Bar-tailed Godwit

The bar-tailed godwit has been recorded in the coastal areas of all Australian states. It is widespread in the Torres Strait and along the east and south-east coasts of Queensland, NSW and Victoria, including the offshore islands. The bar-tailed godwit is found mainly in coastal habitats such as large intertidal sand flats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays (DotE 2014h).

This species was recorded adjacent to the site along the coastline in low numbers (maximum individual count of 29 at the Dampier Saltworks) by Bamford (2009a). Given the bar-tailed godwits preference for coastal habitats it is considered unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area, therefore the risk of significant impact occurring to the bar-tailed godwit because of developing the site for industrial purposes is considered low.

5.3.2.7 Southern Giant Petrel

The southern giant petrel is a marine bird that occurs in Antarctic through to subtropical waters. This species is widespread throughout the Southern Ocean and known to breed on six sub-Antarctic and Antarctic islands (DotE 2014i). It is considered unlikely that this oceanic species would be recorded in the ANSIA Improvement Plan Area; therefore, the risk of affecting the southern giant petrel is considered low.

5.3.2.8 Eastern Curlew

The eastern curlew breeds in Siberia, Kamchatka and Mongolia, and winters in coastal areas of east Asia and Australia. Within Australia, the eastern curlew primarily has a coastal distribution and is rarely recorded inland. The species is found in all states, particularly the north, east, and south-east regions, including Tasmania, and have a continuous distribution from Barrow Island and Dampier Archipelago, Western Australia, through the Kimberley Division and along Northern Territory, Queensland, and New South Wales coasts and the islands of Torres Strait. The eastern curlew is most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sand flats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets. The birds are often recorded among salt marsh and on mudflats fringed by mangroves, and sometimes they use the mangroves. The birds are also found in salt works and sewage farms (DotE 2014j).



This species was recorded along the coastline adjacent to the site with a maximum count of 10 at Beadon Creek in Onslow by Bamford (2009a). Given the eastern curlew's preference for estuarine habitats, it is considered unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area; therefore, the risk of significant impact occurring to this species because of developing the site for industrial purposes is considered low.

5.3.2.9 Night Parrot

The distribution of the night parrot is very poorly understood with a small number of confirmed and well-regarded records from arid and semi-arid regions of Queensland, South Australia, Western Australia and the Northern Territory. The night parrot inhabits arid and semi-arid areas that are characterised by having dense, low vegetation. consisting of *Triodia* grasslands in stony or sandy environments, and of samphire and chenopod shrublands, including genera such as *Atriplex*, *Bassia* and *Maireana*, on floodplains and claypans, and on the margins of saltlakes, creeks or other sources of water (DotE 2014k).

In the vicinity of the ANSIA Improvement Plan Area, the night parrot is known from one recording from the DPaW search results made in 1967 near Mount Stuart which is a significant distance outside of the site. Given the isolated nature and age of the DPaW recording and that this species was not recorded by fauna surveys undertaken for either the Wheatstone or the Macedon project areas (Biota 2010a; Bamford 2009b) it is considered that this species is most likely absent from the ANSIA Improvement Plan Area.

5.3.2.10 Fairy Tern

Within Australia, the fairy tern occurs along the coasts of Victoria, Tasmania, South Australia and Western Australia, occurring as far north as the Dampier Archipelago near Karratha. This species nests on sheltered sandy beaches, spits and banks above the high tide line and below vegetation and has been found in embayments of a variety of habitats including offshore, estuarine or lacustrine (lake) islands, wetlands and mainland coastline (DotE 2014).

This species was not recorded by the fauna surveys undertaken for either the Wheatstone or the Macedon project (Biota 2010a; Bamford 2009a; 2009b). Given the fairy tern's preference for coastal habitats, it is considered unlikely to occur within the terrestrial habitats of the ANSIA Improvement Plan Area; therefore, the risk of significant impact occurring to this species because of developing the site for industrial purposes is considered low.



5.4 Mammals

The northern quoll was the only threatened mammal species identified as potentially occurring near the ANSIA Improvement Plan Area (Appendix 3).

5.4.1 Northern Quoll

The northern quoll is found in eastern and northern Queensland, northern parts of the Northern Territory, the Kimberley and the Pilbara. Islands off the Western Australian coast that support northern quolls include Adolphus, Augustus, Bigge, Boongaree, Dolphin, Hidden, Koolan and Wollaston (DotE 2014m).

In the Pilbara, the Great Sandy Desert, Gibson Desert and Little Sandy Deserts define the distributional boundaries of northern quoll in the north, east and south. Records from the Pilbara bioregion are scattered across the four subregions; namely the Hamersley, Fortescue Plains, Chichester and Roebourne Plains subregions with records extending as far west as the Little Sandy Desert and as far south as Karinjini National Park(DotE 2014m).

The majority of recent Pilbara records have come from the Rocklea, Macroy and Robe land systems. These land systems do not occur within the ANSIA Improvement Plan Area and comprise of basalt hills, mesas, high and low plateaux, lower slopes, occasional tor fields and stony plains supporting either hard or soft spinifex grasslands. The northern quoll has also been recorded in other land systems, which comprise sandstone and dolomite hills and ridges, shrublands, sandy plains, clay plans and tussock grasslands and coastal fringes including dunes islands and beaches (DotE 2014m).

The land systems preferred by the northern quoll are not present within the ANSIA Improvement Plan Area and northern quolls were not recorded by fauna surveys undertaken for either the Wheatstone or the Macedon project areas (Biota 2010a; Bamford 2009b). Bamford (2009b) identifies the low rocky hills in the south-east of the Macedon project area did not contain small caves and crevices that this species favours, however noted that the lower reaches of the Ashburton River may provide suitable habitat for the northern quoll.

The DPaW search results identify that three northern quolls have been recorded near the Wheatstone project area between 2012 and 2013 indicating that there is likely to be at least some habitat for this species near the ANSIA Improvement Plan Area. Habitat critical to the survival of this species (Commonwealth of Australia 2011) includes:

- rocky habitats such as ranges, escarpments, mesas, ranges, gorges, breakaways, boulder fields, major drainage line or treed creek lines
- structurally diverse woodland or forest areas containing large diameter trees, termite mounds or hollow logs
- offshore islands where the northern quoll is known to exist.



No habitat critical to the survival of the northern quoll has been identified or is expected to occur within the ANSIA Improvement Plan Area. Informed by the findings of Bamford (2009b), and critical habitat requirements of this species, the lower reaches of the Ashburton River approximately 2 km west of the site may provide suitable habitat for a low-density population of northern quoll.

Given the large area of similar habitat available for this species surrounding the ANSIA Improvement Plan Area, and the isolated nature of development proposed within the site, it is considered unlikely that the northern quoll would be significantly impacted by the development of the ANSIA Improvement Plan Area for industrial purposes.

5.5 Migratory Bird Species

Bamford (2009a) undertook two surveys for Migratory Waterbirds in the Wheatstone project area, November 2008 and March 2009. Bamford (2009a) found that key water bird habitats were Town Beach (in Onslow), near-coastal tidal flats near the Turbridgi Gas Plant, near coastal flats between the Wheatstone project area and the Onslow salt ponds and on the inland freshwater marshes (Figure 4). Migratory waterbird numbers were found by Bamford (2009a) to be generally low in a regional context, with exceptions being non-conservation significant duck, heron and ibis species on the inland freshwater marshes in March.

Bamford (2009a) observed that the greatest concentration of migratory waterbirds was on the coastal flats between the Wheatstone project area and the Onslow salt ponds. Bamford (2009a) noted that these birds were probably roosting and/or foraging close to or within the Wheatstone project area and concluded that any potential impacts on this area is unlikely to be significant as these near coastal claypan and tidal habitats are extensive in the Onslow.

The key finding of Bamford (2009a) was that the Wheatstone project area and surrounding areas do not support important numbers of migratory waterbirds with potential impacts upon migratory waterbirds likely to be low.

Within the ANSIA Improvement Plan Area, the littoral land system is associated with migratory waterbird habitat and was included in the Bamford (2009a) survey area (Figure 4). Informed by Bamford's findings it is considered that the terrestrial habitats within the site are of limited habitat value and are unlikely to support significant numbers of migratory waterbirds. It is considered that the risk of significant impact occurring to migratory waterbird species because of developing the ANSIA Improvement Plan Area for industrial purposes is low.



5.6 Other Specially Protected Fauna

5.6.1 Peregrine Falcon

The peregrine falcon is widely distributed throughout Australian habitats inclusive of woodlands, wetlands and open country, although they are generally absent from treeless and waterless deserts and dense forests (Birds Australia 2012). Peregrine falcons prefer cliff faces as nest sites.

The DPaW search results identify that this species has been recorded twice recently near the ANSIA Improvement Plan Area (Appendix 2). Bamford (2009a) noted that no cliff faces were observed in the vicinity of the Wheatstone project area. Given the relative homogeneity of the topography of the ANSIA Improvement Plan Area (Figure 5) when compared to the Wheatstone project area it is considered unlikely that any cliff faces are located within the site therefore it is unlikely that the peregrine falcon would be significantly impacted.

5.7 Priority Species

Priority species have been recorded within or in the vicinity of the Wheatstone and Macedon project areas Biota (2010a) and Bamford (2009b) are:

- little northern freetail-bat (Priority I)
- western pebble-mound mouse (Priority 4)
- short-tailed mouse (Priority 4)
- bush stone-curlew (Priority 4)
- Australian bustard (Priority 4)
- star finch (western) (Priority 4)
- flock bronzewing (Priority 4).

Figure 6 shows the location where these species where recorded and the number of individuals recorded by Biota (2010a) within the ANSIA Improvement Plan Area.

It is considered that a small proportion of local habitat suitable for these taxa would be cleared relative to their wider distribution in Onslow and the wider region, therefore the risk of significant impact occurring to these priority species as a result of developing the site for industrial purposes is considered to be low.

5.8 Claypan Ephemeral Fauna

Biota (2010c) assessed the ephemeral fauna of the claypans present within the Wheatstone project area and found that the assemblage of fauna species in the claypans was similar to those represented in the reference sites located in the vicinity of the project area. ENV (2012a) noted that the zooplankton and macro-invertebrate taxa



recorded in the Wheatstone project area were considered to be widespread in Onslow. Biota (2010c) concluded that it is unlikely that any significant claypan fauna diversity values would be compromised by the implementation of the Wheatstone project.

Given the homogeneity of fauna habitats near the ANSIA Improvement Plan Area, it is considered that it is unlikely that any significant claypan fauna diversity values would be compromised by the development of the site for industrial purposes.

5.9 Subterranean Fauna

Biota (2010d) assessed the subterranean fauna occurring in the Wheatstone project area and surrounds Biota (2010d) sampled a total of 18 bore holes for troglofauna and stygofauna over three sampling phases. A total of 14,398 invertebrate specimens representing eight orders were recorded, none of these species was troglomorphic (Biota 2010d). The two stygal taxa were collected from three bore holes during this study (Figure 6) were considered by Biota (2010d) not to be restricted to the Wheatstone study area.

Given the homogeneity of fauna habitats near the ANSIA Improvement Plan Area, it is considered that it is unlikely that any significant troglofauna or stygofauna diversity values would be compromised by the development of the site for industrial purposes.

5.10 Marine Turtles

The DPaW search results identify that green turtles (*Chelonia mydas*) and flatback turtles (*Natator depressus*) are known to utilise the Ashburton River Delta Beach, approximately 4.5 km west of the ANSIA Improvement Plan Area, for nesting (Figure 1).

For the Wheatstone project, Pendoley (2009) undertook a three day line-census and snap shot survey of the coastline between Urala Beach and Onslow Back Beach in February which recorded one newly laid and one emerged flatback turtle nest; and evidence of 18 nests laid prior to the survey (five of which were confirmed flatback nests) at the Ashburton River Delta Beach.

Pendoley(2009) noted that the observed level of flatback nesting along mainland beaches is not regionally or even locally significant based on current knowledge of marine turtles nesting in the region. Pendoley (2009) found that hatching emergence patterns indicated very little disruption to sea-finding behaviour.

The development of the ANSIA Improvement Plan Area for industrial purposes has the potential to contribute to cumulative light impacts (skyglow), to the existing night light environment of Ashburton River Delta Beach, which may potentially disrupt turtle nesting and hatchling sea finding behaviours. Baseline lighting studies may be required to inform the expected cumulative lighting impacts from the industrial development of the site upon marine turtles nesting on the Ashburton River Delta Beach.



6.0 CONCLUSIONS

This Terrestrial Fauna Review identifies that the terrestrial fauna habitats classified by the Level 2 Fauna Survey for the Wheatstone project (Biota 2010a) and the Site Inspection and Targeted Survey for the Macedon project (Bamford 2009b) are likely to be equivalent to the unsurveyed areas of the ANSIA Improvement Plan Area and surrounding lands.

The homogeneity of terrestrial habitats near the site dictates that the terrestrial fauna assemblages supported by these habitats are unlikely to vary between surveyed and unsurveyed portions of ANSIA Improvement Plan Area. This similarity in habitat types and species assemblages is also likely be mirrored in ephemeral claypan and subterranean ecosystems. The findings of Biota (2010a; 2010b; 2010c and 2010d) and Bamford (2009a; 2009b), along with the DPaW search results; can be used to infer the likely fauna assemblages of the unsurveyed areas of the ANSIA Improvement Plan Area.

This Terrestrial Fauna Review indicates that there is low likelihood of terrestrial conservation significant fauna species being dependent upon the habitats identified within the ANSIA Improvement Plan Area for continuing survival. Informed by the DPaW a search result there is a low risk that part of the ANSIA Improvement Plan Area may have at least some habitat value for the northern quoll. Bamford (2009b) identifies the low rocky hills in the south-east of the Macedon project area did not contain small caves and crevices that this species favours, however noted that the lower reaches of the Ashburton River, approximately 2 km west of the site, may provide suitable habitat for this species. No habitat critical to the survival of the northern quoll has been identified or is expected to occur within the site and the terrestrial habitat within the ANSIA Improvement Plan Area is not restricted to the site's boundaries.

There is a low risk that significant claypan fauna diversity values would be compromised; that troglobitic species could occur and that stygal fauna would be restricted to the ANSIA Improvement Plan Area.

Baseline lighting studies may be required to inform the expected cumulative lighting impacts from the industrial development of the ANSIA Improvement Plan Area upon marine turtles nesting on the Ashburton River Delta Beach.



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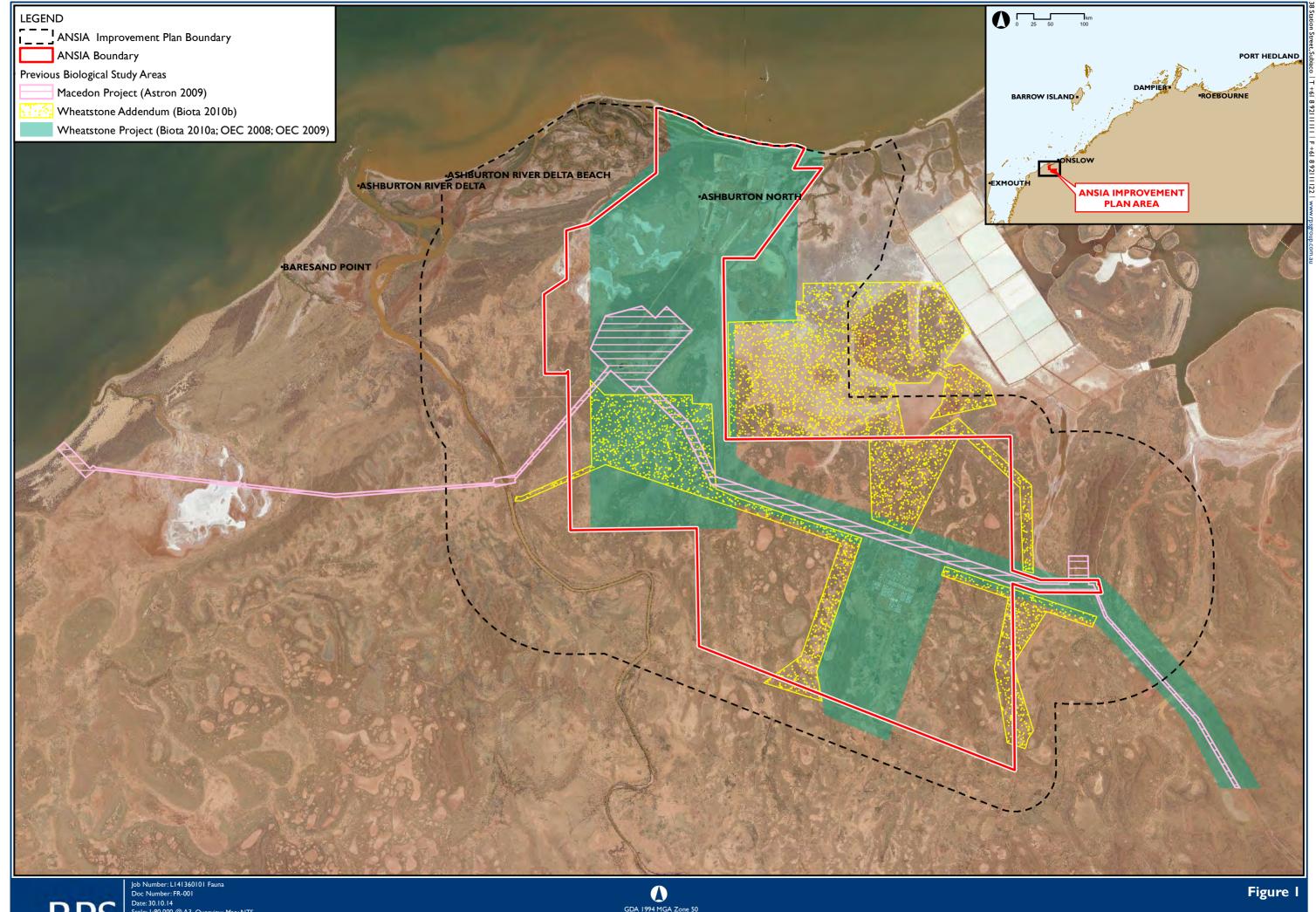
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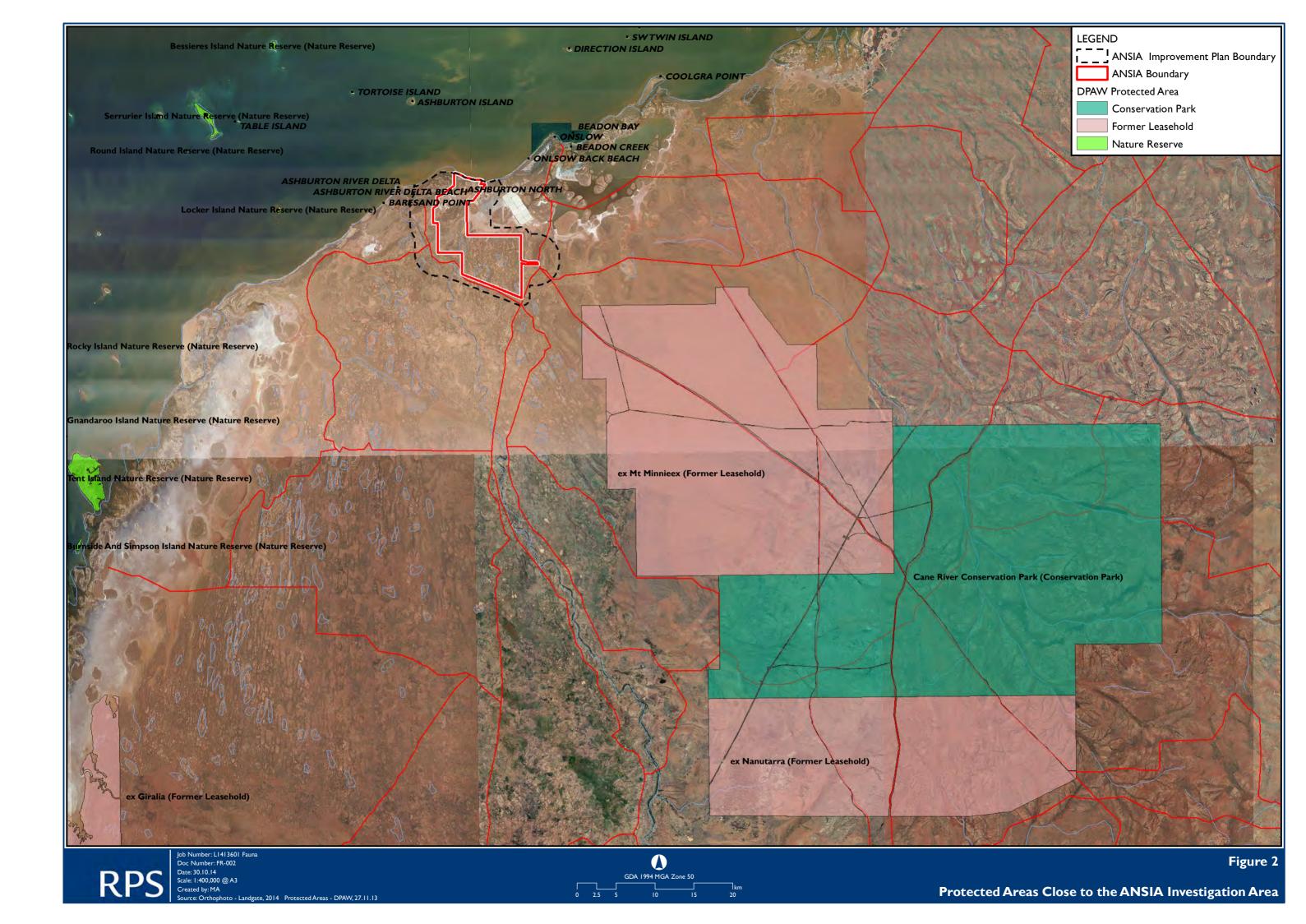


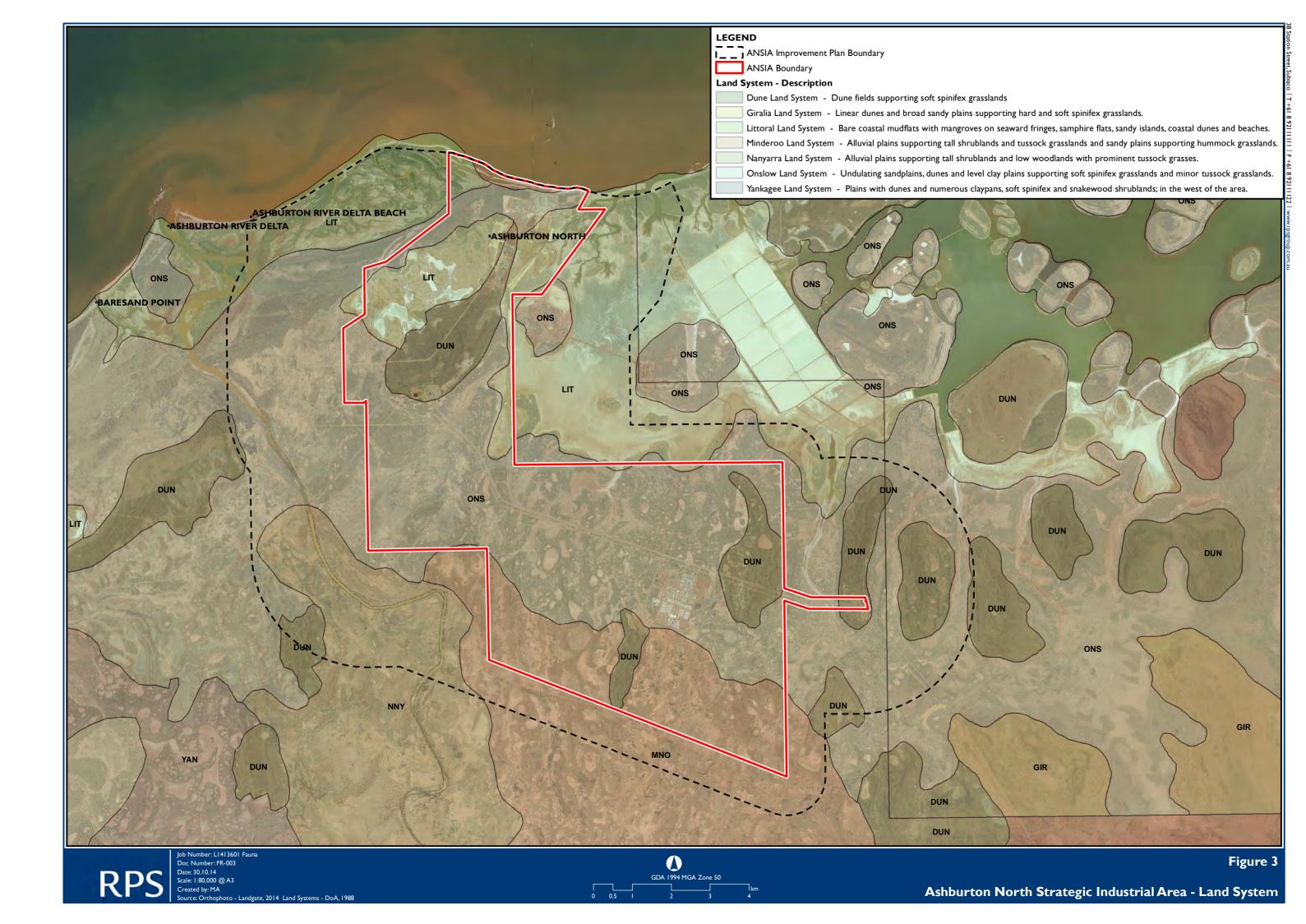
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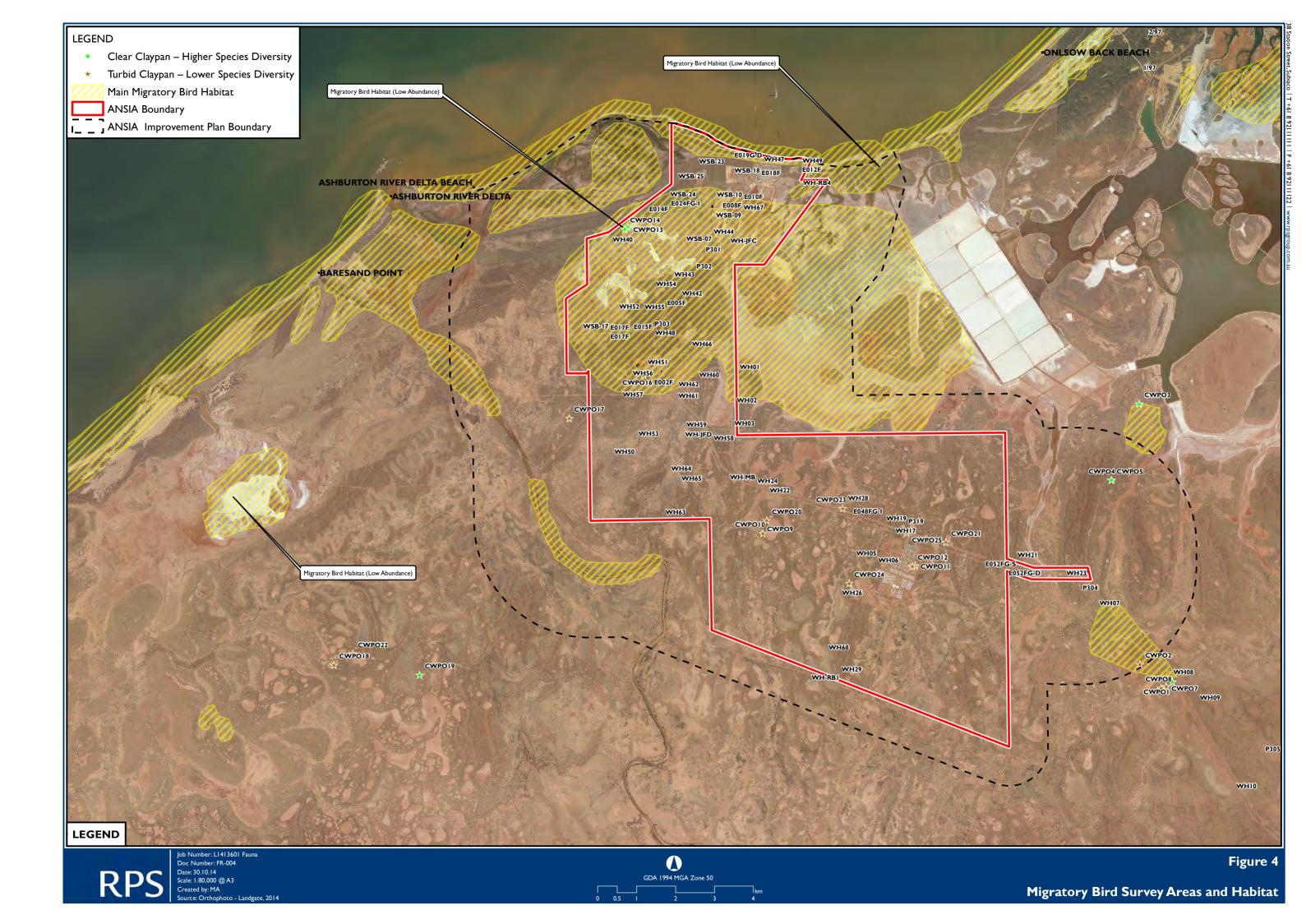


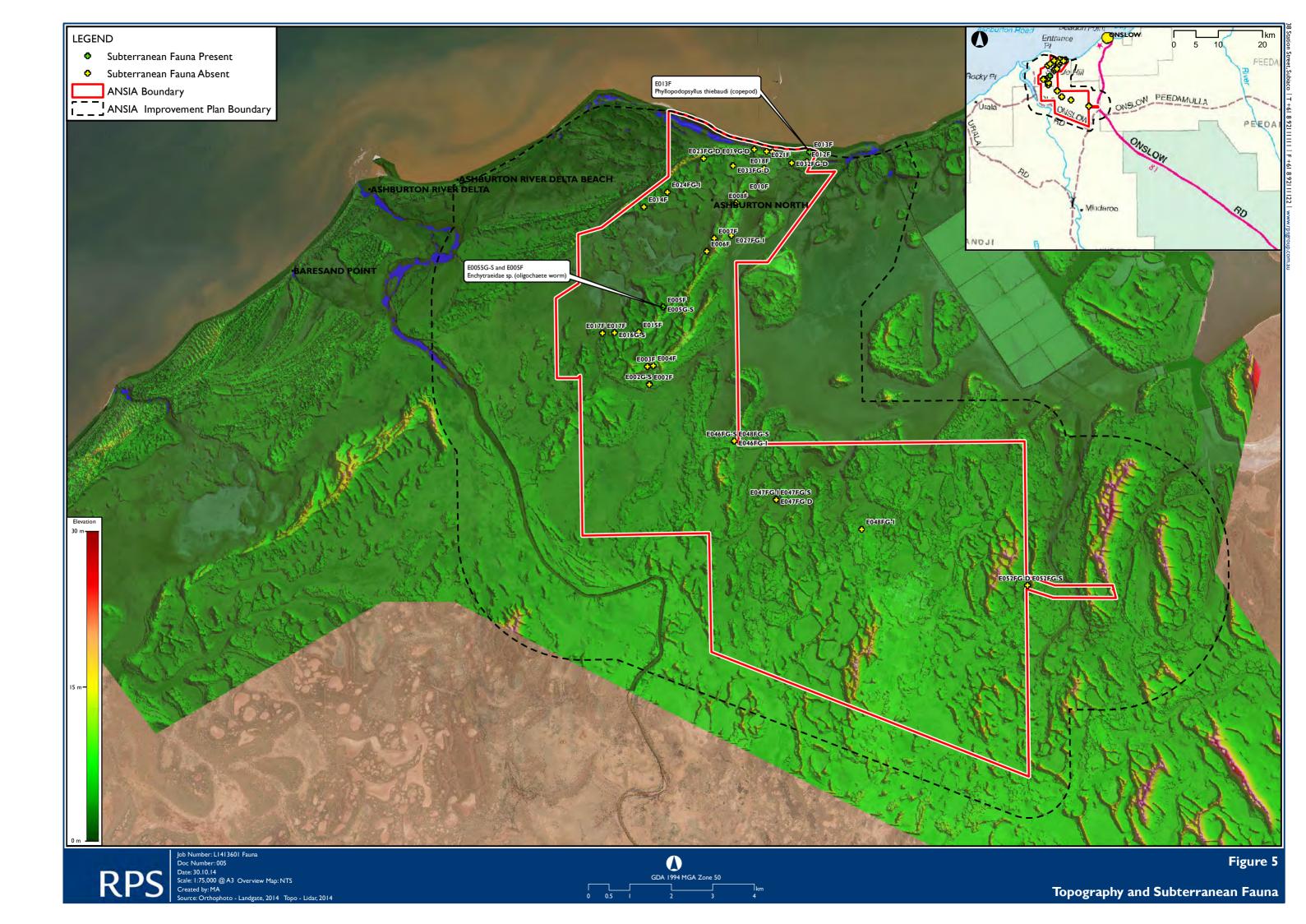
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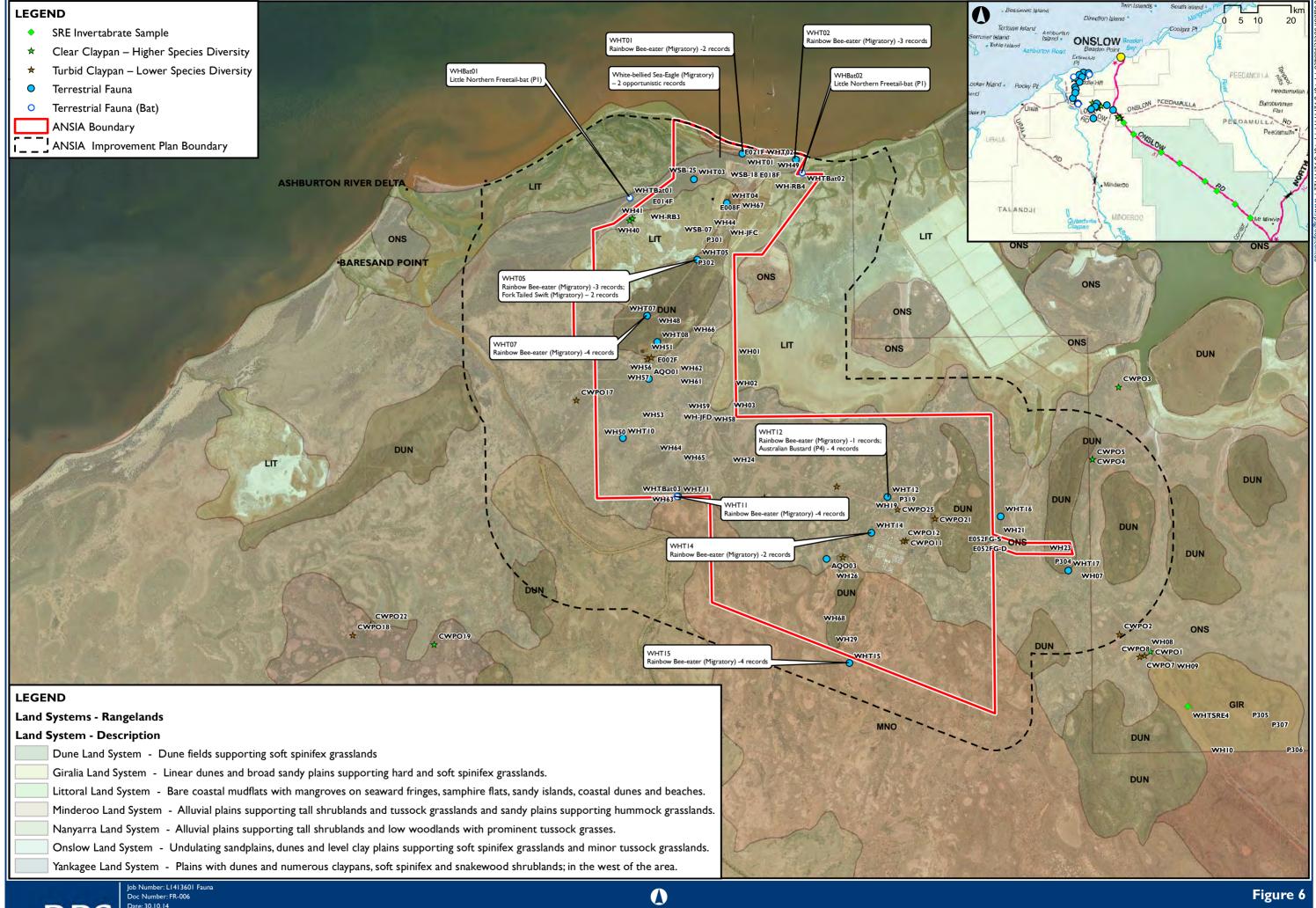














APPENDIX I

Priority Codes and Categories of Threatened Species



APPENDIX I: Priority Codes and Categories of Threatened Species

I.I Definition of Priority Codes

Priority I: Poorly Known Species

Taxa that are known from one or a few collections or sight records (generally less than five), all on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, Shire, Westrail and Main Roads WA road, gravel and soil reserves, and active mineral leases and under threat of habitat destruction or degradation. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes.

Priority 2: Poorly Known Species

Taxa that are known from one or a few collections or sight records, some of which are on lands not under imminent threat of habitat destruction or degradation, e.g. national parks, conservation parks, nature reserves, State forest, vacant Crown land, water reserves, etc. Taxa may be included if they are comparatively well known from one or more localities but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes.

Priority 3: Poorly Known Species

Taxa that are known from collections or sight records from several localities not under imminent threat, or from few but widespread localities with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Taxa may be included if they are comparatively well known from several localities but do not meet adequacy of survey requirements and known threatening processes exist that could affect them.

Priority 4: Rare, Near Threatened and Other Species in need of Monitoring

- a. Rare. Taxa that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.
- b. Near Threatened. Taxa that are considered to have been adequately surveyed and that do not qualify for Conservation Dependent, but that are close to qualifying for Vulnerable.



c. Taxa that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Priority 5: Conservation Dependent Taxa

Taxa that are not threatened but are subject to a specific conservation program, the cessation of which would result in the taxon becoming threatened within five years.

1.2 Categories of Threatened Species

Threatened fauna may be listed in any one of the following categories as defined in Section 179 of the EPBC Act.

1.2.1 Section 179 Categories of Threatened Species

- (I) A native species is eligible to be included in the extinct category at a particular time if, at that time, there is no reasonable doubt that the last member of the species has died.
- (2) A native species is eligible to be included in the extinct in the wild category at a particular time if, at that time:
 - (a) it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range
 - (b) it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
- (3) A native species is eligible to be included in the critically endangered category at a particular time if, at that time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria.
- (4) A native species is eligible to be included in the endangered category at a particular time if, at that time:
 - (a) It is not critically endangered
 - (b) It is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria.
- (5) A native species is eligible to be included in the vulnerable category at a particular time if, at that time:
 - (a) It is not critically endangered or endangered



- (b) It is facing a high risk of extinction in the wild in the medium term future, as determined in accordance with the prescribed criteria.
- (6) A native species is eligible to be included in the conservation dependent category at a particular time if, at that time:
 - (a) The species is the focus of a specific conservation program the cessation of which would result in the species becoming vulnerable, endangered or critically endangered.
 - (b) The following subparagraphs are satisfied:
 - (i) The species is a species of fish.
 - (ii) The species is the focus of a plan of management that provides for management actions necessary to stop the decline of, and support the recovery of, the species so that its chances of long term survival in nature are maximised.
 - (iii) The plan of management is in force under a law of the Commonwealth or of a State or Territory.
 - (iv) Cessation of the plan of management would adversely affect the conservation status of the species.

(7) In subsection (6):

fish includes all species of bony fish, sharks, rays, crustaceans, molluscs and other marine organisms, but does not include marine mammals or marine reptiles.

Species listed as "conservation dependent" and "extinct" are not matters of national environmental significance and therefore do not trigger the EPBC Act.



APPENDIX 2

Results of Database Searches



NatureMap Species Report

Created By Guest user on 10/09/2014

Current Names Only Yes
Core Datasets Only Yes

Method 'By Circle'

Centre 115°01' 05" E,21°45' 06" S

Buffer 15km

	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
1.	4895	Abutilon lepidum			
2.	42920	Abutilon sp. Dioicum (A.A. Mitchell PRP 1618)			
3.	43021	Abutilon sp. Pritzelianum (S. van Leeuwen 5095)		P1	
4.	3241	Acacia bivenosa			
5.	13500	Acacia coriacea subsp. coriacea			
6.	14088	Acacia cyperophylla var. cyperophylla			
7.	19456	Acacia stellaticeps			
8.	3577	Acacia tetragonophylla (Kurara, Wakalpuka)			
9.	3579	Acacia trachycarpa (Minni Ritchi, Balgali)			
10.	-17600	Acanthopagrus latus			
11.	-16776	Acanthopagrus palmaris			
12.	25243	Acanthophis pyrrhus (Desert Death Adder)			
13.	25535	Accipiter cirrocephalus (Collared Sparrowhawk)			
14.	25536	Accipiter fasciatus (Brown Goshawk)			
15.	41323	Actitis hypoleucos (Common Sandpiper)		IA	
16.	17422	Adriana tomentosa var. tomentosa			
17.	25544	Aegotheles cristatus (Australian Owlet-nightjar)			
18.	3680	Aeschynomene indica (Budda Pea)			
19.	4907	Alyogyne pinoniana (Sand Hibiscus)			
20.	-14392	Ambassis gymnocephalus			
21.	-17037	Amniataba caudavittata			
22.	-16970	Amniataba percoides			
23.		Amniataba percoides?			Υ
24.		Amphibolurus longirostris (Long-nosed Dragon)			
25.		Aname ellenae			
26.		Anas gracilis (Grey Teal)			
27.		Anas superciliosa (Pacific Black Duck)			
28.		Angianthus acrohyalinus (Hook-leaf Angianthus)			
29.		Anhinga melanogaster (Darter)			
30.		Antaresia stimsoni (Stimson's Python)			
31.		Antaresia stimsoni subsp. stimsoni (Stimson's Python)			
32.		Anthus australis (Australian Pipit)			
33.		Apus pacificus (Fork-tailed Swift)		IA	
34.		Aquila audax (Wedge-tailed Eagle)			
35.		Aquila morphnoides (Little Eagle)			
36.		Ardea alba (Great Egret)			
37.		Ardea garzetta (Little Egret)			
38.		Ardea modesta (Eastern Great Egret)		IA	
39.		Ardea novaehollandiae (White-faced Heron)			
40.		Ardea pacifica (White-necked Heron)			
41.		Ardea sacra (Eastern Reef Egret, Eastern Reef Heron)		IA	
42.		Ardeotis australis (Australian Bustard)		P4	
43.		Arenaria interpres (Ruddy Turnstone)		IA	
44.		Arothron manilensis			
45.		Arrhamphus sclerolepis			
46.		Artamus cinereus (Black-faced Woodswallow)			
47.		Artamus cyanopterus (Dusky Woodswallow) Artamus cyanopterus (Dusky Woodswallow)			
48.		Artamus leucorynchus (White-breasted Woodswallow)			
49.		Artamus personatus (Masked Woodswallow) Artamus personatus (Masked Woodswallow)			
50.		Aspidites melanocephalus (Black-headed Python)			
51.		Atherinid sp.			
52.		Atherinomorus endrachtensis			
53.		Atherinomorus vaigiensis			
55.	.0.04				





	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
54.		Atriplex bunburyana (Silver Saltbush)			
55.		Atriplex semilunaris (Annual Saltbush)			
56.		Austronibea oedegenys?			Υ
57. 58.		Aythya australis (Hardhead) Bonamia erecta			
59.		Bos taurus (European Cattle)	Υ		
60.		Brachyscome cheilocarpa			
61.		Brachyscome ciliocarpa			
62.	24359	Burhinus grallarius (Bush Stone-curlew)		P4	
63.	25561	Butorides striatus (Striated Heron, Mangrove Heron)			
64.		Cacatua roseicapilla (Galah)			
65.		Cacatua sanguinea (Little Corella)			
66.		Cacomantis pallidus (Pallid Cuckoo)			
67. 68.		Calandrinia polyandra (Parakeelya)		IA	
69.		Calidris acuminata (Sharp-tailed Sandpiper) Calidris alba (Sanderling)		IA IA	
70.		Calidris and (Garidelling) Calidris canutus subsp. rogersi (Red Knot (north-eastern Siberia))		T	
71.		Calidris ferruginea (Curlew Sandpiper)		T	
72.		Calidris ruficollis (Red-necked Stint)		IA	
73.	24790	Calidris tenuirostris (Great Knot)		Т	
74.	25454	Canis lupus (Dog, Dingo)	Υ		
75.		Cassytha aurea var. aurea			
76.		Centipeda minima subsp. macrocephala			
77.		Centropus phasianinus (Pheasant Coucal)			
78. 79.		Certhionyx variegatus (Pied Honeyeater) Charaphan inhanais (Northern Francial hat)			
79. 80.		Chaerephon jobensis (Northern Freetail-bat) Charadrius leschenaultii (Greater Sand Plover)		IA	
81.		Charadrius melanops (Black-fronted Dotterel)		IA	
82.		Charadrius mongolus (Lesser Sand Plover)		Т	
83.	24377	Charadrius ruficapillus (Red-capped Plover)			
84.	24378	Charadrius veredus (Oriental Plover)		IA	
85.	25336	Chelonia mydas (Green Turtle)		T	
86.	-16247	Chelonodon patoca			
87.		Chenonetta jubata (Australian Wood Duck, Wood Duck)			
88.		Cheramoeca leucosternus (White-backed Swallow) Characteristic (Harafield's Branza Cycles)			
89. 90.		Chrysococcyx basalis (Horsfield's Bronze Cuckoo) Chrysococcyx osculans (Black-eared Cuckoo)			
91.		Chrysopogon fallax (Golden Beard Grass)			
92.		Cincloramphus cruralis (Brown Songlark)			
93.	24834	Cincloramphus mathewsi (Rufous Songlark)			
94.	24288	Circus approximans (Swamp Harrier)			
95.	24289	Circus assimilis (Spotted Harrier)			
96.		Colluricincla harmonica (Grey Shrike-thrush)			
97.		Coracina novaehollandiae (Black-faced Cuckoo-shrike)			
98. 99.		Corvus bennetti (Little Crow) Corvus orru (Torresian Crow)			
100.		Corynotheca pungens			
101.		Coturnix pectoralis (Stubble Quail)			
102.		Coturnix ypsilophora (Brown Quail)			
103.	24420	Cracticus nigrogularis (Pied Butcherbird)			
104.	-14049	Cracticus tibicen subsp. longirostris			Υ
105.		Cracticus torquatus (Grey Butcherbird)			
106.		Craterocephalus capreoli			
107.		Cressa australis		^	
108. 109.		Crocodylus porosus (Salt-water Crocodile) Crotalaria cunninghamii subsp. sturtii		S	
110.		Crotalaria medicaginea var. neglecta			
111.		Cryptoerithus occultus			
112.		Ctenophorus caudicinctus (Ring-tailed Dragon)			
113.		Ctenophorus caudicinctus subsp. caudicinctus (Ring-tailed Dragon)			
114.	24872	Ctenophorus femoralis (Dune Dragon)			
115.		Ctenophorus isolepis (Crested Dragon, Military Dragon)			
116.		Ctenophorus isolepis subsp. gularis (Central Military Dragon)			
117.		Ctenophorus isolepis subsp. isolepis (Crested Dragon, Military Dragon)			
118. 119.		Ctenophorus rubens (Ped Dragon) Ctenophorus rubens (Ped Dragon)			
119. 120.		Ctenophorus rubens (Red Dragon) Ctenophorus rufescens (Red Rock Dragon)			
121.		Ctenophorus rurescens (Neu Nock Bragon) Ctenotus calurus			
122.		Ctenotus grandis			
123.	25043	Ctenotus grandis subsp. titan			
				(Francisco)	******







		Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
124.		Ctenotus hanloni			
125. 126.		Ctenotus iapetus Ctenotus maryani			
127.		Ctenotus pantherinus (Leopard Ctenotus)			
128.		Ctenotus pantherinus subsp. ocellifer (Leopard Ctenotus)			
129.	25066	Ctenotus quattuordecimlineatus			
130.	25069	Ctenotus rufescens			
131.	25073	Ctenotus saxatilis (Rock Ctenotus)			
132.		Ctenotus schomburgkii			
133.		Cullen cinereum			
134. 135.		Cullen martinii Cyclorana maini (Sheep Frog)			
136.		Cyclorana platycephala (Water-holding Frog)			
137.		Cygnus atratus (Black Swan)			
138.	808	Cyperus pygmaeus			
139.	809	Cyperus rigidellus			
140.		Dacelo leachii (Blue-winged Kookaburra)			
141.		Dacelo leachii subsp. leachii (Blue-winged Kookaburra)			
142. 143.		Dasykaluta rosamondae (Little Red Kaluta) Dasyurus hallucatus (Northern Quoll)		Т	
144.		Decazesia hecatocephala		·	
145.		Delma haroldi			
146.	25001	Delma nasuta			
147.		Delma tincta			
148.		Demansia psammophis (Yellow-faced Whipsnake)			
149. 150.		Diplodactylus conspicillatus (Fat-tailed Gecko) Diporiphora adductus (Carnarvon Dragon)			
150.		Drepane punctata			
152.		Dromaius novaehollandiae (Emu)			
153.		Drombus triangularis			
154.	24084	Dugong dugon (Dugong)		S	
155.		Dysphania plantaginella			
156.		Elanus caeruleus (Black-shouldered Kite)			
157. 158.		Eleocharis papillosa Emblema pictum (Painted Finch)		P3	
159.		Engraulis australis?			Υ
160.		Ephalophis greyae			
161.	24387	Ephippiorhynchus asiaticus subsp. australis (Black-necked Stork)			
162.	-14255	Epinephelus lanceolatus			
163.		Epthianura aurifrons (Orange Chat)			
164. 165.		Epthianura tricolor (Crimson Chat) Eremiascincus pallidus (Western Narrow-banded Skink, Narrow-banded Sand			
103.	45501	Swimmer)			
166.	24837	Eremiornis carteri (Spinifex-bird)			
167.	17177	Eremophila forrestii subsp. viridis		P3	
168.	403	Eriachne benthamii (Swamp Wanderrie)			
169.		Eriachne gardneri			
170.		Eriochloa pseudoacrotricha (Perennial Cupgrass) Erythrogonys cinctus (Red-kneed Dotterel)			
171. 172.		Escualosa thoracata			
173.		Eulalia aurea			
174.	4635	Euphorbia myrtoides			
175.	12097	Euphorbia tannensis subsp. eremophila (Desert Spurge)			
176.		Eurostopodus argus (Spotted Nightjar)			
177.		Falco conchroides (Australian Kostroll)			
178. 179.		Falco cenchroides (Australian Kestrel) Falco longipennis (Australian Hobby)			
180.		Falco peregrinus (Peregrine Falcon)		S	
181.	24041	Felis catus (Cat)	Υ		
182.	35558	Flaveria trinervia (Speedy Weed)	Υ		
183.		Fordonia leucobalia (White-bellied Mangrove Snake)			
184.		Frankenia ambita			
185. 186.		Furina ornata (Moon Snake) Gehyra pilbara			
187.		Gehyra punctata			
188.		Gehyra purpurascens			
189.		Gehyra variegata			
190.		Geopelia cuneata (Diamond Dove)			
191.		Geopelia humeralis (Bar-shouldered Dove)			
192.	25585	Geopelia striata (Zebra Dove)			
				Donates at	







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
193.		Geophaps plumifera (Spinifex Pigeon)			
194. 195.		Gerres oyena Conviciona lovicastor (Manarova Gonzagona)			
195.		Gerygone levigaster (Mangrove Gerygone) Gerygone tenebrosa (Dusky Gerygone)			
197.		Glareola maldivarum (Oriental Pratincole)		IA	
198.	2835	Glinus lotoides (Hairy Carpet Weed)			
199.	7526	Goodenia microptera			
200.		Goodenia pascua			
201.		Gossypium australe (Native Cotton)			
202. 203.		Grallina cyanoleuca (Magpie-lark) Grevillea eriostachya (Flame Grevillea, Kaliny-kalinypa)			
204.		Grevillea stenobotrya			
205.	24484	Grus rubicunda (Brolga)			
206.	24487	Haematopus longirostris (Pied Oystercatcher)			
207.		Haliaeetus leucogaster (White-bellied Sea-Eagle)		IA	
208.		Haliastur indus (Brahminy Kite)			
209. 210.		Haliastur indus subsp. girrenera (Brahminy Kite) Haliastur sphenurus (Whistling Kite)			
211.		Halophryne diemensis			
212.		Haloragis gossei			
213.	23464	Haloragis gossei var. inflata			
214.	24297	Hamirostra melanosternon (Black-breasted Buzzard)			
215.		Heliotropium crispatum			
216.		Heliotropium pachyphyllum	.,		
217. 218.		Hemidactylus frenatus (Asian House Gecko) Hemiramphus robustus	Υ		
219.		Herklotsichthys collettei?			Υ
220.		Heteronotia binoei (Bynoe's Gecko)			
221.	-16781	Hilsa kelee?			Υ
222.	25734	Himantopus himantopus (Black-winged Stilt)			
223.		Hirundo ariel (Fairy Martin)			
224.		Hirundo neoxena (Welcome Swallow)			
225. 226.		Hirundo nigricans (Tree Martin) Hydrophis ornatus			
227.		Indigofera colutea (Sticky Indigo)			
228.		Indigofera georgei (Bovine Indigo)			
229.	3980	Indigofera linifolia			
230.	3981	Indigofera linnaei (Birdsville Indigo)			
231.		Indigofera monophylla			
232. 233.		Lalage tricolor (White-winged Triller) Larus novaehollandiae (Silver Gull)			
234.		Leggadina lakedownensis (Short-tailed Mouse, Karekanga)		P4	
235.		Leiognathus decorus			
236.	-17490	Leiognathus equulus			
237.	3039	Lepidium platypetalum (Slender Peppercress)			
238.		Lerista baynesi			
239.		Lerista bipes			
240. 241.		Lerista clara Lerista elegans			
241.		Lerista eiegaris Lerista onsloviana			
243.		Lialis burtonis			
244.	25238	Liasis olivaceus subsp. barroni (Pilbara Olive Python)		Т	
245.		Lichmera indistincta (Brown Honeyeater)			
246.		Limosa lapponica (Bar-tailed Godwit)		IA T	
247. 248.		Limosa lapponica subsp. menzbieri (Bar-tailed Godwit (northern Siberian))		Т	
248.		Litoria caerulea (Green Tree Frog) Litoria rubella (Little Red Tree Frog)			
250.		Liza melinoptera			
251.		Liza subviridis			
252.	-15122	Liza vaigiensis			
253.		Lotus cruentus (Redflower Lotus)			
254.		Lucasium stenodactylum			
255. 256.		Lutjanus argentimaculatus Lutjanus fulviflamma			
257.		Lutjanus russellii			
258.		Macropus robustus (Euro)			
259.		Macropus rufus (Red Kangaroo, Marlu)			
260.		Malurus lamberti (Variegated Fairy-wren)			
261.		Malurus leucopterus (White-winged Fairy-wren)			
262.	4962	Malvastrum americanum (Spiked Malvastrum)	Υ	_	







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
263.	24583	Manorina flavigula (Yellow-throated Miner)			70
264.		Melopsittacus undulatus (Budgerigar)			
265.		Menetia greyii			
266. 267.		Merops ornatus (Rainbow Bee-eater) Milvus migrans (Black Kite)		IA	
268.		Mimulus gracilis			
269.		Mirafra javanica (Horsfield's Bushlark, Singing Bushlark)			
270.	-17809	Mugil cephalus			
271.	24223	Mus musculus (House Mouse)	Υ		
272.		Myriocephalus oldfieldii			
273.		Myriocephalus rudallii		_	
274. 275.		Natator depressus (Flatback Turtle) Nematalosa come		Т	
276.		Nematalosa sp.			
277.		Nematalosa vlaminghi			
278.		Neobassia astrocarpa			
279.	25422	Neobatrachus aquilonius (Northern Burrowing Frog)			
280.	25424	Neobatrachus fulvus (Tawny Trilling Frog)			
281.	25685	Neochmia ruficauda (Star Finch)			
282.		Nephrurus levis			
283.		Nephrurus levis subsp. occidentalis			
284. 285.		Nephrurus levis subsp. pilbarensis Netuma thalassina			Y
286.		Nicotiana occidentalis subsp. occidentalis			1
287.		Ningaui timealeyi (Pilbara Ningaui)			
288.	25748	Ninox novaeseelandiae (Boobook Owl)			
289.	25430	Notaden nichollsi (Desert Spadefoot)			
290.	24224	Notomys alexis (Spinifex Hopping-mouse)			
291.		Numenius madagascariensis (Eastern Curlew)		Т	
292.		Numenius minutus (Little Curlew)		IA	
293. 294.		Numenius phaeopus (Whimbrel) Nymphicus hollandicus (Cockatiel)		IA	
295.		Ocyphaps lophotes (Crested Pigeon)			
296.		Oreoica gutturalis (Crested Bellbird)			
297.		Oryctolagus cuniculus (Rabbit)	Υ		
298.	24620	Pachycephala lanioides (White-breasted Whistler)			
299.		Pandion haliaetus subsp. cristatus (Osprey)			
300.		Panicum decompositum (Native Millet, Kaltu-kaltu)			
301.		Pardalotus rubricatus (Red-browed Pardalote)			
302. 303.		Parkinsonia aculeata (Parkinsonia) Pelates octolineatus	Y		
304.		Pelecanus conspicillatus (Australian Pelican)			
305.		Pellona ditchela			
306.	-15459	Pentapodus vitta			
307.	25504	Perameles bougainville (Western Barred Bandicoot, Marl)		Т	
308.		Periophthalmus argentilineatus			
309.		Phalacrocorax carbo (Great Cormorant)			
310.		Phalacrocorax melanoleucos (Little Pied Cormorant)			
311. 312.		Phalacrocorax sulcirostris (Little Black Cormorant) Phalacrocorax varius (Pied Cormorant)			
313.		Phaps chalcoptera (Common Bronzewing)			
314.		Phaps histrionica (Flock Bronzewing, Flock Pigeon)		P4	
315.	1042	Phoenix dactylifera (Date Palm)	Υ		
316.		Pimelea ammocharis			
317.		Planigale ingrami (Long-tailed Planigale)			
318.		Platycephalus indicus			
319. 320.		Platycercus zonarius (Australian Ringneck, Ring-necked Parrot) Plectorhinchus gibbosus			
321.		Pluchea longiseta			
322.		Pluchea rubelliflora			
323.	24383	Pluvialis squatarola (Grey Plover)		IA	
324.	25510	Pogona minor (Dwarf Bearded Dragon)			
325.		Pogona minor subsp. minor (Dwarf Bearded Dragon)			
326.		Polygala isingii			
327.		Pomadasys kaakan Pomatastamus tamparalia (Cray arayunad Pahhlar)			
328. 329.		Pomatostomus temporalis (Grey-crowned Babbler) Pomatostomus temporalis subsp. rubeculus (Grey-crowned Babbler)			
330.		Pristis microdon (Freshwater Sawfish)		P3	
331.				Т	
	34037	Pristis zijsron (Green Sawfish)			
332.		Pristis Zijstoff (Green Sawiish) Prosopis pallida (Mesquite, Algaroba)	Υ		

Department of Parks and Wildlife





	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
333.		Protonibea diacanthus			
334.		Pseudechis australis (Mulga Snake)			
335.		Pseudomys chapmani (Western Pebble-mound Mouse, Ngadji)		P4	
336. 337.		Pseudomys desertor (Desert Mouse) Pseudomys hermannsburgensis (Sandy Inland Mouse)			
338.		Pseudonaja mengdeni (Western Brown Snake)			
339.		Pseudonaja modesta (Ringed Brown Snake)			
340.		Pseudonaja nuchalis (Gwardar, Northern Brown Snake)			
341.		Pseudorhombus argus			
342.		Psophodes occidentalis (Western Wedgebill, Chiming Wedgebill)			
343.	8192	Pterocaulon sphacelatum (Apple Bush)			
344.	2741	Ptilotus macrocephalus (Featherheads)			
345.	2746	Ptilotus nobilis (Tall Mulla Mulla)			
346.	2751	Ptilotus polystachyus (Prince of Wales Feather)			
347.		Pygopus nigriceps			
348.		Quoya loxocarpa			
349.		Quoya paniculata			
350. 351.		Ramphotyphlops ammodytes Pamphotyphlops annus			
351.		Ramphotyphlops grypus Ramphotyphlops hamatus			
353.		Ramphotyphlops pilbarensis			
354.		Recurvirostra novaehollandiae (Red-necked Avocet)			
355.		Rhipidura leucophrys (Willie Wagtail)			
356.	24457	Rhipidura phasiana (Mangrove Grey Fantail)			
357.	13297	Rhodanthe psammophila			
358.	24982	Rhynchoedura ornata (Western Beaked Gecko)			
359.	6484	Samolus repens (Creeping Brookweed)			
360.	14027	Samolus sp. Millstream (M.I.H. Brooker 2076)			
361.		Sauropus trachyspermus			
362.		Scaevola anchusifolia			
363.		Scaevola pulchella			
364.		Scaevola sericophylla			
365. 366.		Schoenoplectus dissachanthus Schoenoplectus subulatus			
367.		Scomberoides commersonnianus			
368.		Scomberoides lysan?			Υ
369.		Sesbania formosa (White Dragon Tree)			·
370.		Sida rohlenae subsp. rohlenae			
371.	-17473	Sillago analis			
372.	-16459	Sillago burrus			
373.	-15537	Sillago ingenuua?			Υ
374.		Sillago lutea			
375.		Sillago sihama			
376.		Simoselaps anomalus (Desert Banded Snake)			
377.		Smicrornis brevirostris (Weebill)			
378. 379.		Sminthopsis macroura (Stripe-faced Dunnart) Sminthopsis youngsoni (Lesser Hairy-footed Dunnart)			
380.		Spinifex longifolius (Beach Spinifex)			
381.		Stemodia sp. Onslow (A.A. Mitchell 76/148)			
382.		Sterna (albifrons) sinensis (White-shafted Little Tern, Little Tern)			
383.		Sterna bengalensis (Lesser Crested Tern)		IA	
384.		Sterna caspia (Caspian Tern)		IA	
385.	25640	Sterna dougallii (Roseate Tern)		IA	
386.	25642	Sterna hirundo (Common Tern)		IA	
387.		Sterna leucoptera (White-winged Black Tern)		IA	
388.		Sterna nilotica (Gull-billed Tern)			
389.		Stolephorus carpentariae			
390.		Streptoglossa liatroides			
391.		Strongylura strongylura Stronghurus icanaa			
392. 393.		Strophurus spinigerus subsp. spinigerus			
393. 394.		Strophurus spinigerus subsp. spinigerus Strophurus strophurus			
394. 395.		Suta punctata (Spotted Snake)			
396.		Swainsona pterostylis			
397.		Tachybaptus novaehollandiae (Australasian Grebe, Black-throated Grebe)			
398.		Tachyglossus aculeatus (Short-beaked Echidna)			
399.	30870	Taeniopygia guttata (Zebra Finch)			
400.	-17160	Tathicarpus butleri			
401.	33236	Tecticornia halocnemoides (Shrubby Samphire)			
402.	33238	Tecticornia halocnemoides subsp. tenuis			
				O. D. Davidson	







	Name ID	Species Name	Naturalised	Conservation Code	¹ Endemic To Query Area
403.	33319	Tecticornia indica subsp. bidens			
404.	15947	Tephrosia sp. B Kimberley Flora (C.A. Gardner 7300)			
405.	41815	Tephrosia sp. Carnarvon (J.H. Ross 2681)			
406.	39422	Tephrosia sp. Onslow (K.R. Newbey 10571)			
407.	-18073	Terapon thaeraps			Υ
408.	-14971	Terapon theraps			
409.	24845	Threskiornis spinicollis (Straw-necked Ibis)			
410.	25202	Tiliqua multifasciata (Central Blue-tongue)			
411.	42351	Todiramphus pyrrhopygius (Red-backed Kingfisher)			
412.	25549	Todiramphus sanctus (Sacred Kingfisher)			
413.	19053	Trachymene pilbarensis			
414.	24803	Tringa brevipes (Grey-tailed Tattler)		IA	
415.	24806	Tringa glareola (Wood Sandpiper)		IA	
416.	24808	Tringa nebularia (Common Greenshank)		IA	
417.	13131	Triodia epactia			
418.	17524	Triumfetta echinata		P3	
419.	24851	Turnix velox (Little Button-quail)			
420.	30954	Tursiops aduncus (Indo-Pacific Bottlenose Dolphin)			
421.	25762	Tyto alba (Barn Owl)			
422.	27348	Udotea argentea			
423.	25209	Varanus acanthurus (Spiny-tailed Monitor)			
424.	25210	Varanus brevicauda (Short-tailed Pygmy Monitor)			
425.	25211	Varanus caudolineatus			
426.	25212	Varanus eremius (Pygmy Desert Monitor)			
427.	25218	Varanus gouldii (Bungarra or Sand Monitor)			
428.	25524	Varanus panoptes (Yellow-spotted Monitor)			
429.	25223	Varanus panoptes subsp. rubidus			
430.	25526	Varanus tristis (Racehorse Monitor)			
431.	31391	Vigna sp. Hamersley Clay (A.A. Mitchell PRP 113)			
432.	20671	Vigna sp. central (M.E. Trudgen 1626)		P2	
433.	24040	Vulpes vulpes (Red Fox)	Υ		
434.	-13199	Wydundra kennedy			
435.	-15802	Yongeichthys nebulosus			
436.	25765	Zosterops lateralis (Grey-breasted White-eye, Silvereye)			
437.	24857	Zosterops luteus (Yellow White-eye)			

- Conservation Codes

 1 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 2
 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.

ME Ilidris canutus subsp. rogersi Ilidris ferruginea Ilidris ferruginea Ilidris tenuirostris Ilidris leschenaultii subsp. leschenaultii	SOURCE_CODE WAM_BIRDS BIRDATLAS2 BIRDATLAS2 FAUNASURVEY WAM BIRDS	36742 161 36746 161 49980	24783 Scolopacidae 24784 Scolopacidae 24784 Scolopacidae 24790 Scolopacidae	Calidris Calidris Calidris Calidris Calidris	canutus subsp. rogersi Merruginea (ferruginea (tenuirostris (Mathews Pontoppidan) Pontoppidan) Horsfield)	Red Knot (north-eastern Siberia) Curlew Sandpiper Curlew Sandpiper Great Knot	Animalia T E Animalia T E Animalia T E Animalia T E	BIRD BIRD BIRD BIRD	TALANDJI ONSLOW ONSLOW TALANDJI	SITE_NAME Ashburton Rr mouth 4 Mile Creek Road, via Onslow Onslow InfrastrucCorridor Onslow	DAY Model	10 190 07 190 07 190 09 200
aradrius leschenaultii subsp. leschenaultii aradrius mongolus aradrius mongolus elonia my das elonia my das	WAM_BIRDS FAUNASURVEY BIRDATLAS2 FAUNASURVEY FAUNASURVEY	urn:lsid:taxonomy.org.au:AVIF:31136 49987 36746 139 672953 715031	24372 Charadriidae 25576 Charadriidae 25576 Charadriidae 25336 Cheloniidae 25336 Cheloniidae	Charadrius Charadrius Charadrius Chelonia Chelonia	leschenaultii subsp. leschenaultii L mongolus F mongolus F my das (my das (Lesson Pallas Pallas Linnaeus) Linnaeus)	Greater Sand Plover (Mongolian) Lesser Sand Plover Lesser Sand Plover Green Turtle Green Turtle	AnimaliaTEAnimaliaTEAnimaliaTEAnimaliaTFAnimaliaTF	BIRD BIRD BIRD REPTILE REPTILE	TALANDJI ONSLOW TALANDJI ONSLOW	Onslow InfrastrucCorridor Onslow ASHBURTON RIVER DELTA Wheatstone Project	04 10 08 09 31 07 15 11 02 10	10 19 09 20 07 19 11 20 10 20
elonia my das elonia my das elonia my das elonia my das	FAUNASURVEY FAUNASURVEY TFAUNA FAUNASURVEY	506293 715032 23396 672954	25336 Cheloniidae 25336 Cheloniidae 25336 Cheloniidae 25336 Cheloniidae	Chelonia Chelonia Chelonia Chelonia	my das (my das (my das (my das (Linnaeus) Linnaeus) Linnaeus) Linnaeus)	Green Turtle Green Turtle Green Turtle Green Turtle	Animalia T F Animalia T F Animalia T F Animalia T F	REPTILE REPTILE REPTILE REPTILE	ONSLOW ONSLOW	Wheatstone Project Wheatstone Project Onslow ASHBURTON RIVER DELTA	08 06 02 10 13 05 16 11	06 20 10 20 05 20 11 20
sy urus hallucatus sy urus hallucatus sy urus hallucatus sis oliv aceus subsp. barroni nosa lapponica subsp. menzbieri	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY WAM_BIRDS	700812 507416 507858	24093 Dasy uridae 24093 Dasy uridae 24093 Dasy uridae 25238 Boidae 24796 Scolopacidae	Dasy urus Dasy urus Liasis	hallucatus C hallucatus C oliv aceus subsp. barroni	Gould Gould Gmith	Northern Quoll Northern Quoll Northern Quoll Pilbara Olive Python Bar-tailed Godwit (northern Siberian)	Animalia T I Animalia T I Animalia T I	MAMMAL MAMMAL REPTILE	TALANDJI ONSLOW TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project Ashburton River	09 10 06 06 23 08 02 09 14 01	09 20
nosa lapponica subsp. menzbieri Itator depressus Itator depressus	WAM_BIRDS FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	121122 121185 672949	24796 Scolopacidae 25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae	Natator Natator Natator	depressus (depressus (depressus (Garman) Garman) Garman)	Bar-tailed Godwit (northern Siberian) Flatback Turtle Flatback Turtle Flatback Turtle Flatback Turtle Flatback Turtle	Animalia T F Animalia T F Animalia T F	REPTILE REPTILE	TALANDJI TALANDJI TALANDJI	Onslow Ashburton River Delta_Overnight tracks Ashburton River Delta_Overnight tracks ASHBURTON RIVER DELTA	28 10 16 12 03 03	12 20 03 20
Itator depressus Itator depressus Itator depressus Itator depressus Itator depressus	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	672948 672947 121180	25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae	Natator Natator Natator Natator Natator Natator	depressus (depressus (depressus (Garman)	Flatback Turtle Flatback Turtle Flatback Turtle Flatback Turtle Flatback Turtle	Animalia T F F Animalia T F F F F F F F F F F F F F F F F F F	REPTILE REPTILE	TALANDJI TALANDJI	Ashburton River Delta West_emerged nests ASHBURTON RIVER DELTA ASHBURTON RIVER DELTA Ashburton River Delta_Overnight tracks ASHBURTON RIVER DELTA	03 03 17 01 15 11 14 12 03 03	01 20 11 20 12 20
tator depressus tator depressus tator depressus tator depressus	WAM_REPTILES FAUNASURVEY WAM_REPTILES FAUNASURVEY	urn:lsid:taxonomy.org.au:REPT:R117875 672950 urn:lsid:taxonomy.org.au:REPT:R117876 672951	25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae 25344 Cheloniidae	Natator Natator Natator	depressus (depressus (depressus (Garman) Garman) Garman) Garman)	Flatback Turtle Flatback Turtle Flatback Turtle Flatback Turtle	Animalia T F Animalia T F Animalia T F Animalia T F	REPTILE REPTILE REPTILE REPTILE		ASHBURTON ISLAND ASHBURTON RIVER DELTA ASHBURTON ISLAND ASHBURTON RIVER DELTA	30 09 15 11 30 09 17 01	09 19 11 20 09 19
menius madagascariensis menius madagascariensis menius madagascariensis menius madagascariensis	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	286758 149 481571 149 199311 149	24798 Scolopacidae 24798 Scolopacidae 24798 Scolopacidae 24798 Scolopacidae	Numenius Numenius Numenius	madagascariensis (madagascariensis (madagascariensis (Linnaeus) Linnaeus) Linnaeus)	Eastern Curlew Eastern Curlew Eastern Curlew Eastern Curlew	Animalia T E Animalia T E Animalia T E	BIRD BIRD BIRD	ONSLOW	Beadon Creek 4 Mile Creek Onslow Onslow	29 07 31 07 31 10 15 07	07 20 07 20 10 20 07 20
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ocody lus porosus Igong dugon Igong dugon Ico peregrinus	FAUNASURVEY FAUNASURVEY WAM_MAMMALS BIRDATLAS2 FAUNASURVEY	507516 urn:lsid:taxonomy.org.au:MAMM:M203 290104 237	24859 Crocody lidae 24084 Dugongidae 24084 Dugongidae 25624 Falconidae 25624 Falconidae	Dugong	dugon (dugon (peregrinus 1	Muller) Muller) Funstall	Salt-water Crocodile Dugong Dugong Peregrine Falcon Peregrine Falcon	Animalia S I Animalia S I Animalia S E	MAMMAL MAMMAL BIRD	ONSLOW TALANDJI	InfrastrucCorridor Wheatstone Project Ashburton River Wheatstone Project	08 09 25 08 10 08	09 20 08 20 08 20 02 20
co peregrinus co peregrinus itis hy poleucos itis hy poleucos	FAUNASURVEY BIRDATLAS1 BIRDATLAS1 BIRDATLAS2	102892 53654 157 53656 157	25624 Falconidae 41323 Scolopacidae 41323 Scolopacidae 41323 Scolopacidae	Falco Actitis Actitis	peregrinus 1 hy poleucos L hy poleucos L	Funstall Linnaeus Linnaeus	Peregrine Falcon Common Sandpiper Common Sandpiper Common Sandpiper	Animalia S F Animalia IA F Animalia IA F	BIRD BIRD BIRD		WHT11 Three Mile Pool, Ashburton River	18 04 17 09 26 12 20 08	04 20 09 19 12 19 08 20
itis hy poleucos itis hy poleucos itis hy poleucos itis hy poleucos	BIRDATLAS2 BIRDATLAS1 BIRDATLAS2 BIRDATLAS2	20921 157 107295 157 416881 157	41323 Scolopacidae 41323 Scolopacidae 41323 Scolopacidae 41323 Scolopacidae	Actitis Actitis Actitis Actitis	hy poleucos L hy poleucos L hy poleucos L	Linnaeus Linnaeus Linnaeus	Common Sandpiper Common Sandpiper Common Sandpiper Common Sandpiper Common Sandpiper	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Ashburton River 3 Mile Pool, Ashburton River Ashburton River	30 08 21 09 03 09 19 07	08 20 09 19 09 20 07 20
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us pacificus us pacificus us pacificus us pacificus	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	504785 504814 102620	25554 Apodidae 25554 Apodidae 25554 Apodidae 25554 Apodidae	Apus Apus	pacificus (pacificus (pacificus (Latham) Latham) Latham)	Fork-tailed Swift Fork-tailed Swift Fork-tailed Swift Fork-tailed Swift	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	PEEDAMULLA TALANDJI TALANDJI	Wheatstone Project Wheatstone Project WHT05 Wheatstone Project	11 02 19 02 19 04 27 02	02 20
is pacificus is pacificus ea modesta ea modesta	FAUNASURVEY BIRDATLAS2 BIRDATLAS1 BIRDATLAS1	498554 335 140499 187 20921 187	25554 Apodidae 25554 Apodidae 41324 Ardeidae 41324 Ardeidae	Ardea Ardea	pacificus (modesta sumodesta sumode	J.E. Gray J.E. Gray	Fork-tailed Swift Fork-tailed Swift Eastern Great Egret Eastern Great Egret	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI ONSLOW TALANDJI TALANDJI	Wheatstone Project	28 02 16 04 05 06 21 09	06 19 09 19
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ea modesta ea modesta ea modesta ea modesta	BIRDATLAS1 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	53656 187 107296 187 459509 187 289175 187	41324 Ardeidae 41324 Ardeidae 41324 Ardeidae 41324 Ardeidae	Ardea Ardea Ardea Ardea	modesta Some Some Some Some Some Some Some Some	J.E. Gray J.E. Gray J.E. Gray J.E. Gray	Eastern Great Egret Eastern Great Egret Eastern Great Egret Eastern Great Egret	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI ONSLOW	Ashburton River 3 Mile Pool Onslow	26 12 30 08 19 05 07 07	12 19 08 20 05 20 07 20
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naria interpres naria interpres idris acuminata idris acuminata	BIRDATLAS2 BIRDATLAS2 BIRDATLAS1 FAUNASURVEY	481571 129 498554 129 43100 163 49983	25736 Scolopacidae 25736 Scolopacidae 24779 Scolopacidae 24779 Scolopacidae	Arenaria Arenaria Calidris Calidris	interpres (interpres (acuminata (Linnaeus) Linnaeus)	Ruddy Turnstone Ruddy Turnstone Sharp-tailed Sandpiper Sharp-tailed Sandpiper	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW TALANDJI TALANDJI	Onslow InfrastrucCorridor	31 10 16 04 26 12 08 09	10 20 04 20 12 19 09 20
idris acuminata idris acuminata idris acuminata idris acuminata idris alba	BIRDATLAS2 BIRDATLAS2 WAM_BIRDS WAM_BIRDS FAUNASURVEY	426641 163 urn:lsid:taxonomy.org.au:AVIF:28980 urn:lsid:taxonomy.org.au:AVIF:28979	24779 Scolopacidae 24779 Scolopacidae 24779 Scolopacidae 24779 Scolopacidae 24780 Scolopacidae	Calidris Calidris Calidris	acuminata (acuminata (acuminata (Horsfield) Horsfield)	Sharp-tailed Sandpiper Sharp-tailed Sandpiper Sharp-tailed Sandpiper Sharp-tailed Sandpiper Sharp-tailed Sandpiper Sanderling	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	ONSLOW	Onslow Onslow Stn Onslow Onslow InfrastrucCorridor	31 08 01 10 05 01 05 01 08 08	08 20 10 20 01 19 01 19
dris alba dris alba dris alba dris ruficollis	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS1	289467 166 498554 166 481571 166 20921 162	24780 Scolopacidae 24780 Scolopacidae 24780 Scolopacidae 24788 Scolopacidae	Calidris Calidris Calidris Calidris Calidris	alba (alba (alba (ruficollis (Pallas) Pallas) Pallas) Pallas)	Sanderling Sanderling Sanderling Red-necked Stint	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW TALANDJI	Onslow Onslow	08 09 10 05 16 04 31 10 21 09	05 20 04 20 10 20 09 19
idris ruficollis idris ruficollis idris ruficollis idris ruficollis	FAUNASURVEY FAUNASURVEY BIRDATLAS2 BIRDATLAS2	49982 708482 36742 162 286754 162	24788 Scolopacidae 24788 Scolopacidae 24788 Scolopacidae 24788 Scolopacidae	Calidris Calidris Calidris Calidris Calidris	ruf icollis (Pallas) Pallas) Pallas) Pallas)	Red-necked Stint Red-necked Stint Red-necked Stint Red-necked Stint	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI ONSLOW ONSLOW	InfrastrucCorridor Wheatstone Project 4 Mile Creek Road, via Onslow 4 Mile Creek	08 09 16 07 20 07 26 07	09 20 07 20 07 19 07 20
dris ruficollis dris ruficollis dris ruficollis aradrius leschenaultii aradrius leschenaultii	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 FAUNASURVEY BIRDATLAS2	426641 162 481571 162 49988	24788 Scolopacidae 24788 Scolopacidae 24788 Scolopacidae 25575 Charadriidae 25575 Charadriidae	Calidris Calidris Charadrius	ruf icollis (ruf icollis (leschenaultii L	_esson	Red-necked Stint Red-necked Stint Red-necked Stint Greater Sand Plover Greater Sand Plover	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	ONSLOW ONSLOW TALANDJI	Onslow Onslow Stn Onslow InfrastrucCorridor Onslow	07 07 01 10 31 10 08 09 23 06	10 20 10 20 10 20
aradrius leschenaultii aradrius leschenaultii aradrius leschenaultii aradrius leschenaultii aradrius veredus	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS1	289467 141 498554 141 481571 141 20921 142	25575 Charadriidae 25575 Charadriidae 25575 Charadriidae 24378 Charadriidae	Charadrius Charadrius Charadrius Charadrius	leschenaultii L leschenaultii L leschenaultii L veredus C	Lesson Lesson Lesson Gould	Greater Sand Plover Greater Sand Plover Greater Sand Plover Oriental Plover	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW TALANDJI	Onslow Onslow	10 05 16 04 31 10 21 09	05 20 04 20 10 20 09 19
aradrius veredus aradrius veredus idonias leucopterus etta sacra	FAUNASURVEY FAUNASURVEY BIRDATLAS2 BIRDATLAS2	700136 700135 5029291 109 30121 191	24378 Charadriidae 24378 Charadriidae 41332 Laridae 41336 Ardeidae	Charadrius Charadrius Chlidonias Egretta	v eredus C v eredus C leucopterus T sacra C	Gould Gould Femminck Gmelin	Oriental Plover Oriental Plover White-winged Black Tern Eastern Reef Egret, Eastern Reef Heron	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI ONSLOW PEEDAMULLA	Wheatstone Project Wheatstone Project Onslow Onslow	16 10 16 10 17 07 27 07	10 20 10 20 07 20
etta sacra etta sacra etta sacra etta sacra etta sacra	BIRDATLAS1 BIRDATLAS2 BIRDATLAS2 BIRDATLAS1 BIRDATLAS2	107297 191 107295 191 43104 191	41336 Ardeidae 41336 Ardeidae 41336 Ardeidae 41336 Ardeidae 41336 Ardeidae	Egretta Egretta Egretta Egretta Egretta	sacra C sacra C sacra C	Gmelin Gmelin Gmelin	Eastern Reef Egret, Eastern Reef Heron Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD		Ashburton River mouth 3 Mile Pool, Ashburton River Ashburton River	21 09 31 08 03 09 26 12	09 19 08 20 09 20 12 19 08 20	
etta sacra etta sacra etta sacra etta sacra	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	459509 191 36746 191 412401 191	41336 Ardeidae 41336 Ardeidae 41336 Ardeidae 41336 Ardeidae	Egretta Egretta Egretta Egretta Egretta	sacra C sacra C sacra C	Gmelin Gmelin Gmelin	Eastern Reef Egret, Eastern Reef Heron	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI ONSLOW ONSLOW	3 Mile Pool Onslow Onslow Onslow	19 05 31 07 06 07 07 07	05 20 07 19 07 20 07 20
etta sacra etta sacra etta sacra etta sacra	BIRDATLAS2 BIRDATLAS2 BIRDATLAS1 BIRDATLAS2	498554 191 149234 191 199311 191	41336 Ardeidae 41336 Ardeidae 41336 Ardeidae 41336 Ardeidae	Egretta Egretta Egretta Egretta	sacra C sacra C sacra C	Gmelin Gmelin Gmelin	Eastern Reef Egret, Eastern Reef Heron	Animalia IA F Animalia IA F Animalia IA F	BIRD BIRD BIRD	ONSLOW	Onslow	31 10 16 04 07 06 15 07	07 20
reola maldiv arum reola maldiv arum reola maldiv arum aeetus leucogaster aeetus leucogaster	FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2 BIRDATLAS2	49990 709039 107297 226	24481 Glareolidae 24481 Glareolidae 24481 Glareolidae 24293 Accipitridae 24293 Accipitridae	Haliaeetus	maldiv arum Saldiv	J.R. Forster J.R. Forster Gmelin)	Oriental Pratincole Oriental Pratincole Oriental Pratincole White-bellied Sea-Eagle White-bellied Sea-Eagle	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI	Wheatstone Project InfrastrucCorridor Wheatstone Project Ashburton River mouth Three Mile Pool, Ashburton River	16 02 08 09 24 01 31 08 20 08	02 20 09 20 01 20 08 20
aeetus leucogaster aeetus leucogaster aeetus leucogaster aeetus leucogaster aeetus leucogaster	BIRDATLAS1 BIRDATLAS1 BIRDATLAS2 FAUNASURVEY	53654 226 43100 226 416881 226	24293 Accipitridae 24293 Accipitridae 24293 Accipitridae 24293 Accipitridae	Haliaeetus Haliaeetus Haliaeetus	leucogaster (leucogaster (leucogaster (leucogaster (White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle	Animalia IA F Animalia IA F Animalia IA F	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Ashburton River	17 09 26 12 19 07 08 09	09 19 12 19 07 20 09 20
aeetus leucogaster aeetus leucogaster aeetus leucogaster aeetus leucogaster	FAUNASURVEY BIRDATLAS2 FAUNASURVEY FAUNASURVEY	459509 226 700856 701356	24293 Accipitridae 24293 Accipitridae 24293 Accipitridae 24293 Accipitridae	Haliaeetus Haliaeetus Haliaeetus	leucogaster (leucogaster (leucogaster (leucogaster (Gmelin) Gmelin)	White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Wheatstone Project 3 Mile Pool Wheatstone Project Wheatstone Project	19 04 19 05 06 03 01 03	03 20 03 20
iaeetus leucogaster iaeetus leucogaster iaeetus leucogaster iaeetus leucogaster iaeetus leucogaster	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2	710967 700855 102914	24293 Accipitridae 24293 Accipitridae 24293 Accipitridae 24293 Accipitridae 24293 Accipitridae	Haliaeetus Haliaeetus Haliaeetus	leucogaster (leucogaster (leucogaster (leucogaster (White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle White-bellied Sea-Eagle	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	TALANDJI TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project WHTBAT01 4 Mile Creek	04 05 23 01 06 03 19 04	32
iaeetus leucogaster osa lapponica osa lapponica osa lapponica	BIRDATLAS2 BIRDATLAS1 BIRDATLAS1 BIRDATLAS1	481571 226 43104 153 53657 153	24293 Accipitridae 30932 Scolopacidae 30932 Scolopacidae 30932 Scolopacidae	Haliaeetus Limosa Limosa	leucogaster (lapponica (lapponica (Gmelin) Linnaeus) Linnaeus)	White-bellied Sea-Eagle Bar-tailed Godwit Bar-tailed Godwit Bar-tailed Godwit	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	***************************************	Onslow	31 10 26 12 15 09 26 12	10 20 12 19
nosa lapponica nosa lapponica nosa lapponica nosa lapponica	FAUNASURVEY BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	289467 153 453195 153	30932 Scolopacidae 30932 Scolopacidae 30932 Scolopacidae 30932 Scolopacidae 30932 Scolopacidae	Limosa Limosa Limosa	lapponica (lapponica (lapponica (Linnaeus) Linnaeus) Linnaeus)	Bar-tailed Godwit Bar-tailed Godwit Bar-tailed Godwit Bar-tailed Godwit Bar-tailed Godwit Bar-tailed Godwit	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW	InfrastrucCorridor Onslow Onslow Onslow Onslow Onslow	08 09 06 07 10 05 23 06	09 20 07 20 05 20 06 20
iosa lapponica losa limosa losa limosa rops ornatus	BIRDATLAS2 BIRDATLAS1 BIRDATLAS1 BIRDATLAS2	199311 153 53656 152 43100 152	30932 Scolopacidae 25741 Scolopacidae 25741 Scolopacidae 24598 Meropidae	Limosa Limosa	lapponica (limosa (limosa (Linnaeus) Linnaeus)	Bar-tailed Godwit Black-tailed Godwit Black-tailed Godwit Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI	Onslow	15 07 26 12 26 12 27 07	07 20 12 19 12 19 07 19
ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS1 BIRDATLAS1 BIRDATLAS2 BIRDATLAS1	140499 329 416881 329 20921 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI	Ashburton River	26 12 05 06 19 07 21 09	12 19 06 19 07 20 09 19
rops ornatus rops ornatus rops ornatus rops ornatus rops ornatus	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS1 BIRDATLAS1	187288 329 426640 329 53654 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops	ornatus L ornatus L ornatus L	_atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI	3 Mile Pool, Ashburton River Three Mile Pool, Ashburton River Ashburton River	03 09 20 08 02 10 17 09 26 12	09 20 08 20 10 20 09 19
ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 BIRDATLAS2 FAUNASURVEY FAUNASURVEY	41358 329 498329 329 506291	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops	ornatus L ornatus L ornatus L		Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Five Mile Pool, Ashburton River Campground Wheatstone Project Wheatstone Project	12 08 05 08 07 06 05 07	·····
rops ornatus rops ornatus rops ornatus	FAUNASURVEY WAM_BIRDS FAUNASURVEY FAUNASURVEY FAUNASURVEY	urn:lsid:taxonomy.org.au:AVIF:8272 700191 182552	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	WHT07 Ashburton River Bridge Wheatstone Project Dune 1 Wheatstone Project	19 04 15 09 09 10 25 11	04 20 09 19 10 20 11 20 08 20
ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus	FAUNASURVEY FAUNASURVEY BIRDATLAS2 FAUNASURVEY BIRDATLAS2	702023 481570 329 700223	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Wheatstone Project Wheatstone Project Near Onslow Wheatstone Project Ashburton River	30 07 30 10 09 10	08 20 07 20 10 20 10 20
ops ornatus ops ornatus ops ornatus ops ornatus	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	702024 50015 103317 103323	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops	ornatus L ornatus L ornatus L	_atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater		BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project InfrastrucCorridor WHT02 WHT14	30 07 08 09 18 04 17 04	07 20 09 20 04 20 04 20
ops ornatus ops ornatus ops ornatus	FAUNASURVEY FAUNASURVEY BIRDATLAS2 BIRDATLAS2	103322 30128 329 290104 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Dune 1 WHT12 5 Mile Pool Ashburton River	25 11 17 04 26 07 10 08	07 19 08 20
ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus	WAM_BIRDS FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	103316 700563 700570	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham _atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Ashburton River Bridge WHT01 Wheatstone Project Wheatstone Project WHT15	15 09 17 04 19 04 16 03 20 04	04 20 04 20
ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 FAUNASURVEY BIRDATLAS2 FAUNASURVEY	498327 329 700222 30127 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops	ornatus L ornatus L ornatus L	.atham .atham .atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Campground Wheatstone Project 3 Mile pool WHT11	06 08 09 10 26 07 19 04	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 FAUNASURVEY FAUNASURVEY FAUNASURVEY	103325 103318 103319	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Twitchen Road WHT15 WHT05 WHT07	26 07 20 04 17 04 17 04	04 20
ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 FAUNASURVEY BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	700190 289467 329 289175 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops Merops	ornatus L ornatus L ornatus L	_atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	ONSLOW ONSLOW	Campground Wheatstone Project Onslow Onslow Onslow	07 08 09 10 10 05 07 07 31 07	07 2
ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	40501 329 289480 329 412401 329 498554 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops Merops Merops	ornatus L ornatus L ornatus L ornatus L	_atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW ONSLOW	Onslow Cemetery Onslow Onslow	31 07 22 07 04 03 06 07 16 04	07 20 04 20
ops ornatus ops ornatus ops ornatus ops ornatus	BIRDATLAS2 FAUNASURVEY BIRDATLAS2 FAUNASURVEY	5089199 329 715061 481571 329 715062	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops Merops Merops Merops	ornatus L ornatus L ornatus L ornatus L	_atham _atham _atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW ONSLOW	Onslow Memorial Boardwalk Wheatstone Project Onslow Wheatstone Project	24 06 17 03 31 10 17 03	06 24 03 24 10 2 03 24
ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus ops ornatus	FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS1 BIRDATLAS2	715068 149234 329	24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae 24598 Meropidae	Merops Merops	ornatus L ornatus L ornatus L	_atham _atham	Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater Rainbow Bee-eater	Animalia IA E Animalia IA E Animalia IA E	BIRD (Wheatstone Project Wheatstone Project Wheatstone Project Onslow	17 06 22 03 15 06 07 06 15 07	06 20 03 20 06 20 06 19 07 20
enius minutus enius phaeopus enius phaeopus enius phaeopus enius phaeopus	BIRDATLAS2 FAUNASURVEY BIRDATLAS2 BIRDATLAS2	426641 151 49974 481571 150 498554 150	24799 Scolopacidae 25742 Scolopacidae 25742 Scolopacidae 25742 Scolopacidae	Numenius Numenius Numenius Numenius	minutus C phaeopus (phaeopus (Gould Linnaeus)	Little Curlew Whimbrel Whimbrel Whimbrel	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW TALANDJI ONSLOW ONSLOW	Onslow Stn InfrastrucCorridor Onslow	15 07 01 10 08 09 31 10 16 04	10 21 09 20 10 20 04 21
anites oceanicus ialis squatarola ialis squatarola na bengalensis	FAUNASURVEY BIRDATLAS2 BIRDATLAS2 FAUNASURVEY	715039 36742 136 481571 136 49994	24497 Hy drobatidae 24383 Charadriidae 24383 Charadriidae 24521 Laridae	Oceanites Pluv ialis Pluv ialis Sterna	oceanicus (squatarola (squatarola (bengalensis L	Kuhl) Linnaeus) Linnaeus) Lesson	Wilson's Storm Petrel Grey Plover Grey Plover Lesser Crested Tern	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW TALANDJI	Wheatstone Project 4 Mile Creek Road, via Onslow Onslow InfrastrucCorridor	07 06 20 07 31 10 08 09	06 2: 07 1: 10 2: 09 2:
na caspia na caspia na dougallii na dougallii	FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2	49993 103954 49995 289467 113	24523 Laridae 24523 Laridae 25640 Laridae 25640 Laridae	Sterna Sterna Sterna Sterna	caspia F caspia F dougallii N	<i>M</i> ontagu	Caspian Tern Caspian Tern Roseate Tern Roseate Tern Roseate Tern	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI ONSLOW	InfrastrucCorridor WHTBAT01 InfrastrucCorridor Onslow Onslow	08 09 18 04 08 09 10 05 31 10	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
na dougallii na hirundo na leucoptera ga brevipes ga brevipes	BIRDATLAS2 FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2	49996 49998 49978	25640 Laridae 25642 Laridae 24529 Laridae 24803 Scolopacidae 24803 Scolopacidae	Sterna Sterna Tringa	hirundo L leucoptera 7 brev ipes (Vieillot)	Roseate Tern Common Tern White-winged Black Tern Grey-tailed Tattler Grey-tailed Tattler	Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Onslow InfrastrucCorridor InfrastrucCorridor InfrastrucCorridor Onslow	31 10 08 09 08 09 08 09 31 07	09 2 09 2 09 2
ga brevipes ga brevipes ga brevipes ga brevipes	BIRDATLAS2 BIRDATLAS2 BIRDATLAS2 BIRDATLAS2	289467 155 289175 155 36742 155 481571 155	24803 Scolopacidae 24803 Scolopacidae 24803 Scolopacidae 24803 Scolopacidae	Tringa Tringa Tringa Tringa Tringa Tringa	brev ipes (brev ipes (brev ipes (brev ipes (Vieillot) Vieillot) Vieillot) Vieillot)	Grey-tailed Tattler Grey-tailed Tattler Grey-tailed Tattler Grey-tailed Tattler	Animalia IA I Animalia IA I Animalia IA I Animalia IA I	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW ONSLOW	Onslow Onslow 4 Mile Creek Road, via Onslow Onslow	10 05 07 07 20 07 31 10	05 2 07 2 07 1 10 2
ga brevipes ga brevipes ga glareola ga nebularia ga nebularia	BIRDATLAS2 BIRDATLAS2 FAUNASURVEY BIRDATLAS2 BIRDATLAS1	498554 155 199311 155 49976 107296 158	24803 Scolopacidae 24803 Scolopacidae 24806 Scolopacidae 24808 Scolopacidae 24808 Scolopacidae	Tringa Tringa Tringa Tringa Tringa	brev ipes (brev ipes (glareola (nebularia (Vieillot) Linnaeus Gunnerus)	Grey -tailed Tattler Grey -tailed Tattler Wood Sandpiper Common Greenshank Common Greenshank	Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD	TALANDJI	Onslow InfrastrucCorridor Ashburton River	16 04 15 07 08 09 30 08 26 12	04 2 07 2 09 2 08 2 12 1
ga nebularia ga nebularia ga nebularia ga nebularia	BIRDATLAS1 BIRDATLAS1 FAUNASURVEY BIRDATLAS2	53656 158 53654 158 700857 481570 158	24808 Scolopacidae 24808 Scolopacidae 24808 Scolopacidae 24808 Scolopacidae	Tringa Tringa Tringa Tringa Tringa	nebularia (nebularia (nebularia (nebularia (nebularia (Gunnerus) Gunnerus) Gunnerus) Gunnerus)	Common Greenshank Common Greenshank Common Greenshank Common Greenshank	Animalia IA E Animalia IA E Animalia IA E Animalia IA	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project Near Onslow	26 12 26 12 17 09 06 03 30 10	12 1: 09 1: 03 2: 10 2:
ga nebularia ga nebularia ga nebularia ga nebularia	FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2	700858 700859 49975 289467 158	24808 Scolopacidae 24808 Scolopacidae 24808 Scolopacidae 24808 Scolopacidae	Tringa Tringa Tringa Tringa Tringa Tringa	nebularia (nebularia (nebularia (nebularia (nebularia (Gunnerus) Gunnerus) Gunnerus) Gunnerus)	Common Greenshank Common Greenshank Common Greenshank Common Greenshank	Animalia IA E Animalia IA E Animalia IA E Animalia IA E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI ONSLOW	Wheatstone Project Wheatstone Project InfrastrucCorridor Onslow	06 03 06 03 08 09 10 05	03 20 03 20 09 20 05 20
ga nebularia ga nebularia sta planiventralis subsp. maryani tis microdon eotis australis	BIRDATLAS2 BIRDATLAS2 WAM_REPTILES FAUNASURVEY BIRDATLAS2	30122 158 urn:lsid:taxonomy.org.au:REPT:R104331 598705	24808 Scolopacidae 24808 Scolopacidae 25164 Scincidae 34036 Pristidae 24610 Otididae	~~~	nebularia (planiv entralis subsp. mary ani S microdon	Gunnerus)	Common Greenshank Common Greenshank Keeled Slider (NW coast Onslow to Barradale), skink Freshwater Sawfish Australian Bustard	Animalia IA E Animalia 1 F Animalia 3	BIRD REPTILE FISH	ONSLOW	Onslow Onslow ONSLOW Mouth Onslow Road	31 10 25 07 11 03 15 04 27 07	10 2 07 1 03 1 04 2 07 1
eotis australis eotis australis eotis australis eotis australis	BIRDATLAS1 BIRDATLAS1 FAUNASURVEY FAUNASURVEY	140499 176 20921 176 505335 701239	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis Ardeotis	australis (australis (australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project Wheatstone Project	27 07 05 06 21 09 14 04 02 05	06 19 09 19 04 20 05 20
eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	700064 508388 700063 700513	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis Ardeotis	australis (australis (australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project	06 04 01 10 06 04 07 04	04 20 10 20 04 20
eotis australis eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	504775 507873 700918	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis	australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD	TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project	13 04 06 02 05 09 01 05 05 04	04 2 02 2 09 2 05 2 04 2
eotis australis eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	701362 505160 505430 706777	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis	australis (australis (australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project	05 04 26 03 19 03 15 04 14 03	03 2 03 2 04 2 03 2
eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	700512 701361 699744 504773	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis Ardeotis	australis (australis (australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI TALANDJI	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project	07 04 26 03 18 07 05 02	04 24 03 24 07 22 02 24
eotis australis eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY FAUNASURVEY	102626 504772 699724	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis	australis (australis (australis (Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI	Wheatstone Project WHT12 Wheatstone Project Wheatstone Project Wheatstone Project	18 08 15 04 05 02 23 03 28 03	04 20 02 20 03 20
eotis australis eotis australis eotis australis eotis australis eotis australis	FAUNASURVEY FAUNASURVEY FAUNASURVEY BIRDATLAS2	702288 702287 505141 36744 176	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis	australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	TALANDJI TALANDJI TALANDJI ONSLOW	Wheatstone Project Wheatstone Project Wheatstone Project Wheatstone Project Onslow access road	28 03 25 04 25 04 09 03 23 07	04 20 04 20 03 20
eotis australis eotis australis	BIRDATLAS2 FAUNASURVEY FAUNASURVEY	151544 176 715015 715014 715017	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae	Ardeotis Ardeotis Ardeotis Ardeotis	australis (australis (australis (australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) J.E. Gray)	Australian Bustard Australian Bustard Australian Bustard Australian Bustard	Animalia 4 E Animalia 4 E Animalia 4 E Animalia 4 E	BIRD BIRD BIRD BIRD	ONSLOW ONSLOW ONSLOW ONSLOW	Onslow Wheatstone Project Wheatstone Project Wheatstone Project	04 04 20 12 20 12 11 06	04 20 12 20 12 20 06 20
eotis australis eotis australis	FAUNASURVEY	£607247	24640	Ardeotis	australis (J.E. Gray)	Australian Bustard		······		Wheatstone Project	16 08	08 20 01 19
eotis australis leotis australis	FAUNASURVEY FAUNASURVEY WAM_BIRDS FAUNASURVEY WAM_BIRDS FAUNASURVEY	urn:lsid:taxonomy.org.au:AVIF:1008 715013 urn:lsid:taxonomy.org.au:AVIF:13466	24610 Otididae 24610 Otididae 24610 Otididae 24610 Otididae 24359 Burhinidae	Ardeotis Ardeotis Ardeotis	australis (australis (J.E. Gray) J.E. Gray) J.E. Gray) Latham)	Australian Bustard Australian Bustard Australian Bustard Bush Stone-curlew	Animalia 4 E Animalia 4	BIRD BIRD BIRD		Onslow Wheatstone Project Onslow; Ullawarra Station, Barlee Range Wheatstone Project	06 04 15 08 07 06	04 20 08 19 06 20

02 - FaunaSearch_RPS_Glasson4904

FaunaSearch_Talandji+20km



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 <u>Environment Assessments</u> and the EPBC Act including significance guidelines, forms and application process details.

Report created: 10/09/14 11:47:05

Summary

Details

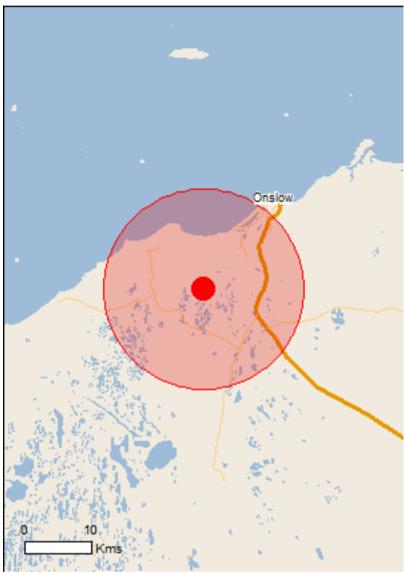
Matters of NES

Other Matters Protected by the EPBC Act

Extra Information

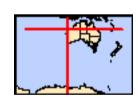
Caveat

<u>Acknowledgements</u>



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

Coordinates
Buffer: 15.0Km



Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Listed Threatened Ecological Communities:	None
Listed Threatened Species:	16
Listed Migratory Species:	26

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 and the heritage values of a place on the Register of the National Estate.

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.

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

Commonwealth Land:	1
Commonwealth Heritage Places:	None
Listed Marine Species:	57
Whales and Other Cetaceans:	13
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine	None

Extra Information

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

Place on the RNE:	2
State and Territory Reserves:	None
Regional Forest Agreements:	None
Invasive Species:	9
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds	Ciaids	Type of Trescrice
Macronectes giganteus		
Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Mammals		
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat may occur within area
<u>Dasyurus hallucatus</u>		
Northern Quoll [331]	Endangered	Species or species habitat likely to occur within area
Eubalaena australis O authoria Biah () Missis 1401	For deal and and	0
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Megaptera novaeangliae		
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to occur within area
Reptiles		
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species habitat likely to occur within area
Caretta caretta		
Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas		
Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Ctenotus angusticeps		
Airlie Island Ctenotus [25937]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
Dermochelys coriacea		31
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
Sharks		
Carcharias taurus (west coast population)		
Grey Nurse Shark (west coast population) [68752]	Vulnerable	Species or species habitat likely to occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Pristis clavata Dwarf Sawfish, Queensland Sawfish [68447]	Vulnerable	Species or species habitat likely to occur within area
Rhincodon typus Whale Shark [66680]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[Resource Information
	n the EDRC Act - Threat	
* Species is listed under a different scientific name o Name	Threatened	Type of Presence
Migratory Marine Birds	Tilleaterieu	Type of Flesence
Apus pacificus		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Macronectes giganteus Southern Giant-Petrel [1060]	Endangered	Species or species habitat may occur within area
Sterna bengalensis Lesser Crested Tern [815]		Breeding known to occur within area
Migratory Marine Species		within area
Balaenoptera edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus Blue Whale [36]	Endangered	Species or species habitat may occur within area
Carcharodon carcharias Great White Shark [64470]	Vulnerable	Species or species habitat may occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Breeding known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur within area
Dugong dugon Dugong [28] Eretmochelys imbricata		Species or species habitat known to occur within area
Eretmochelys imbricata Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area

Name	Threatened	Type of Presence
Eubalaena australis		•
Southern Right Whale [40]	Endangered	Species or species habitat may occur within area
Manta birostris		
Giant Manta Ray, Chevron Manta Ray, Pacific Manta Ray, Pelagic Manta Ray, Oceanic Manta Ray [84995] Megaptera novaeangliae		Species or species habitat known to occur within area
Humpback Whale [38]	Vulnerable	Congregation or aggregation known to
		occur within area
Natator depressus		
Flatback Turtle [59257]	Vulnerable	Breeding known to occur within area
<u>Orcinus orca</u>		
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
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations)		
Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		within area
Haliaeetus leucogaster		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Hirundo rustica		
Marana arnatus		Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Migratory Wetlands Species		arou
Ardea alba		
Great Egret, White Egret [59541]		Breeding known to occur within area
Ardea ibis		_
Charadrius varadus		Species or species habitat likely to occur within area
Charadrius veredus Oriental Distantal Dettaral [222]		Charles ar anasiss
Oriental Plover, Oriental Dotterel [882] Glareola maldivarum		Species or species habitat may occur within area
Oriental Pratincole [840]		Species or species
Onemai i Taurioue [040]		habitat may occur within area

Other Matters Protected by the EPBC Act

[Resource Information] Commonwealth Land

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 -

[Resource Information] **Listed Marine Species**

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

Type of Presence Name Threatened

Birds

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 likely to occur

within area

Charadrius veredus

Oriental Plover, Oriental Dotterel [882] Species or species

habitat may occur within

area

Glareola maldivarum

Oriental Pratincole [840] Species or species

habitat may occur within

area

<u>Haliaeetus leucogaster</u>

White-bellied Sea-Eagle [943] Species or species

habitat known to occur

within area

Hirundo rustica

Barn Swallow [662] Species or species

habitat may occur within

area

Macronectes giganteus

Southern Giant-Petrel [1060] Species or species Endangered

habitat may occur within

Merops ornatus

Rainbow Bee-eater [670] Species or species

habitat may occur within

area

Pandion haliaetus

Osprey [952] Breeding known to occur

within area

Sterna bengalensis

Lesser Crested Tern [815] Breeding known to occur

within area

Fish

Bulbonaricus brauni

Braun's Pughead Pipefish, Pug-headed Pipefish Species or species habitat may occur within [66189]

area

Campichthys tricarinatus

Three-keel Pipefish [66192] Species or species

habitat may occur within

area

Choeroichthys brachysoma

Pacific Short-bodied Pipefish, Short-bodied Species or species

habitat may occur within Pipefish [66194]

area

Choeroichthys suillus

Pig-snouted Pipefish [66198] Species or species

Name	Threatened	Type of Presence
		habitat may occur within
		area
Doryrhamphus janssi		
Cleaner Pipefish, Janss' Pipefish [66212]		Species or species
		habitat may occur within area
Doryrhamphus negrosensis		arca
Flagtail Pipefish, Masthead Island Pipefish		Species or species
[66213]		habitat may occur within
		area
Festucalex scalaris		0
Ladder Pipefish [66216]		Species or species habitat may occur within
		area
Filicampus tigris		
Tiger Pipefish [66217]		Species or species
		habitat may occur within
Halicampus brocki		area
Brock's Pipefish [66219]		Species or species
		habitat may occur within
		area
Halicampus grayi		
Mud Pipefish, Gray's Pipefish [66221]		Species or species
		habitat may occur within area
Halicampus nitidus		arca
Glittering Pipefish [66224]		Species or species
		habitat may occur within
I lelie amenue en inima etnia		area
Halicampus spinirostris Spiny-snout Pipefish [66225]		Species or species
Spiriy-shout Pipelish [00223]		habitat may occur within
		area
Haliichthys taeniophorus		
Ribboned Pipehorse, Ribboned Seadragon		Species or species
[66226]		habitat may occur within
Hippichthys penicillus		area
Beady Pipefish, Steep-nosed Pipefish [66231]		Species or species
		habitat may occur within
I Para a company and an extensi		area
Hippocampus angustus Western Spiny Seaborse, Narrow bellied Seaborse		Species or species
Western Spiny Seahorse, Narrow-bellied Seahorse [66234]		Species or species habitat may occur within
[00201]		area
Hippocampus histrix		
Spiny Seahorse, Thorny Seahorse [66236]		Species or species
		habitat may occur within
Hippocampus kuda		area
Spotted Seahorse, Yellow Seahorse [66237]		Species or species
		habitat may occur within
		area
Hippocampus planifrons Flat face Scaborse [66238]		Species or species
Flat-face Seahorse [66238]		Species or species habitat may occur within
		area
Micrognathus micronotopterus		
Tidepool Pipefish [66255]		Species or species
		habitat may occur within
Solegnathus hardwickii		area
Pallid Pipehorse, Hardwick's Pipehorse [66272]		Species or species
		habitat may occur within
		area
Solegnathus lettiensis Curtharia Dinaharaa Indonesian Dinafiah [CC272]		Onaciae an an aria
Gunther's Pipehorse, Indonesian Pipefish [66273]		Species or species habitat may occur within
		area
Solenostomus cyanopterus		
Robust Ghostpipefish, Blue-finned Ghost Pipefish,		Species or species
[66183]		habitat may occur within

Name	Threatened	Type of Presence
		area
Solonostomus paognius		5 5 5.
Solenostomus paegnius		
Rough-snout Ghost Pipefish [68425]		Species or species
		habitat may occur within
		area
Syngnathoides biaculeatus		
Double-end Pipehorse, Double-ended Pipehorse,		Species or species
·		•
Alligator Pipefish [66279]		habitat may occur within
		area
<u>Trachyrhamphus bicoarctatus</u>		
Bentstick Pipefish, Bend Stick Pipefish, Short-		Species or species
tailed Pipefish [66280]		habitat may occur within
tanda i iponori [00200]		area
Trochyrhamphus langirostria		alea
<u>Trachyrhamphus longirostris</u>		
Straightstick Pipefish, Long-nosed Pipefish,		Species or species
Straight Stick Pipefish [66281]		habitat may occur within
		area
Mammals		
<u>Dugong dugon</u>		
Dugong [28]		Species or species
		habitat known to occur
		within area
Reptiles		
•		
Acalyptophis peronii		0
Horned Seasnake [1114]		Species or species
		habitat may occur within
		area
Aipysurus apraefrontalis		
Short-nosed Seasnake [1115]	Critically Endangered	Species or species
Short-nosed Seashake [1113]	Childany Endangered	Species or species
		habitat likely to occur
		within area
<u>Aipysurus duboisii</u>		
Dubois' Seasnake [1116]		Species or species
in the second of		habitat may occur within
		area
Ainvourus avdauvii		alea
Aipysurus eydouxii		
Spine-tailed Seasnake [1117]		Species or species
		habitat may occur within
		area
<u>Aipysurus laevis</u>		
Olive Seasnake [1120]		Species or species
Olive Seasilake [1120]		·
		habitat may occur within
		area
Astrotia stokesii		
Stokes' Seasnake [1122]		Species or species
• •		habitat may occur within
		area
Caretta caretta		aroa
Loggerhead Turtle [1763]	Endangered	Species or species
		habitat known to occur
		within area
<u>Chelonia mydas</u>		
Green Turtle [1765]	Vulnerable	Breeding known to occur
	Vaniorabio	within area
Darmachalus cariacas		within area
<u>Dermochelys coriacea</u>		
Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Breeding likely to occur
		within area
<u>Disteira kingii</u>		
Spectacled Seasnake [1123]		Species or species
Speciacieu Seasilake [1123]		·
		habitat may occur within
		area
<u>Disteira major</u>		
Olive-headed Seasnake [1124]		Species or species
. ,		habitat may occur within
		area
Emydocopholus appulatus		area
Emydocephalus annulatus		•
Turtle-headed Seasnake [1125]		Species or species
		habitat may occur within
		area
Ephalophis greyi		
North-western Mangrove Seasnake [1127]		Species or species
. 13.11. 11301011 Mangrovo Oddonako [112/]		•
		habitat may occur within
		area

Name	Threatened	Type of Presence
Eretmochelys imbricata		
Hawksbill Turtle [1766]	Vulnerable	Breeding known to occur within area
<u>Hydrophis czeblukovi</u>		
Fine-spined Seasnake [59233]		Species or species habitat may occur within area
<u>Hydrophis elegans</u> Elegant Seasnake [1104]		Species or species habitat may occur within area
Hydrophis ornatus		area
Spotted Seasnake, Ornate Reef Seasnake [1111]		Species or species habitat may occur within area
Natator depressus Flatback Turtle [59257]	Vulnerable	Breeding 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 edeni		
Bryde's Whale [35]		Species or species habitat may occur within area
Balaenoptera musculus		
Blue Whale [36]	Endangered	Species or species habitat 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	Species or species habitat may occur within area
<u>Grampus griseus</u>		
Risso's Dolphin, Grampus [64]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Congregation or aggregation known to
One in the same of		occur within area
Orcinus orca Killer Whale, Orca [46]		Species or species habitat may occur within area
Sousa chinensis		
Indo-Pacific Humpback Dolphin [50]		Species or species habitat likely to 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 Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops aduncus (Arafura/Timor Sea populations) Spotted Bottlenose Dolphin (Arafura/Timor Sea populations) [78900]		Species or species habitat likely to occur

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

[Resource Information]

Extra Information

Places on the RNE

Note that not all Indigenous sites may be listed.		
Name	State	Status
Natural		
Coastal Margin Exmouth Gulf to Cape Preston	WA	Indicative Place
Historic		
Old Onslow Townsite	WA	Indicative Place
Invasive Species		[Resource Information
Weeds reported here are the 20 species of national signals that are considered by the States and Territories biodiversity. The following feral animals are reported: and Cane Toad. Maps from Landscape Health Project 2001.	es to pose a particularly sig Goat, Red Fox, Cat, Rabb	gnificant threat to it, Pig, Water Buffalo
Name	Status	Type of Presence
Mammals		,
Capra hircus		
Goat [2]		Species or species habitat likely to occur within area
Equus asinus		
Donkey, Ass [4]		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
Mus musculus		
House Mouse [120] Oryctolagus cuniculus		Species or species habitat likely to occur within area
Rabbit, European Rabbit [128]		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		William G. GG
Cenchrus ciliaris		
Buffel-grass, Black Buffel-grass [20213] Parkinsonia aculeata		Species or species habitat likely to occur within area
Parkinsonia, Jerusalem Thorn, Jelly Bean Tree,		Species or species
Horse Bean [12301]		habitat likely to occur

Name
Status
Type of Presence
within area

Prosopis spp.
Mesquite, Algaroba [68407]
Species or species
habitat likely to occur
within area

Coordinates

-21.75193 115.01833

Caveat

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

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World Heritage and Register of National Estate properties, Wetlands of International 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.

For species where the distributions are well known, maps are digitised from sources such as recovery plans and detailed habitat studies. Where appropriate, core breeding, foraging and roosting areas are indicated under 'type of presence'. For species whose distributions are less well known, point locations are collated from government wildlife authorities, museums, and non-government organisations; bioclimatic distribution models are generated and these validated by experts. In some cases, the distribution maps are based solely on expert knowledge.

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:

- -Department of Environment, Climate Change and Water, New South Wales
- -Department of Sustainability and Environment, Victoria
- -Department of Primary Industries, Parks, Water and Environment, Tasmania
- -Department of Environment and Natural Resources, South Australia
- -Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts
- -Environmental and Resource Management, Queensland
- -Department of Environment and Conservation, Western Australia
- -Department of the Environment, Climate Change, Energy and Water
- -Birds Australia
- -Australian Bird and Bat Banding Scheme
- -Australian National Wildlife Collection
- -Natural history museums of Australia
- -Museum Victoria
- -Australian Museum
- -SA 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, Atherton and Canberra
- -University of New England
- -Ocean Biogeographic Information System
- -Australian Government, Department of Defence
- -State Forests of NSW
- -Geoscience Australia
- -CSIRO
- -Other groups and individuals

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

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

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APPENDIX 3

Fauna List



APPENDIX 3: Fauna List

This list of conservation significant terrestrial vertebrate species has been developed based upon the results of the desktop assessment.

Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Reptile						
Airlie Island skink (Ctenotus angusticeps)	Rare or likely to become extinct	Vulnerable	No	No	Yes	No
Pilbara olive python (<i>Liasis olivaceus</i> subsp. barroni)	Rare or likely to become extinct	Vulnerable	Yes	Yes	No	No
Keeled slider (NW coast Onslow to Barradale) (Lerista planiventralis)	Priority 1	N/A	Yes	Yes	N/A	No
Bird						
Common sandpiper (Actitis hypoleucos)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Fork-tailed swift (Apus pacificus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Great egret (Ardea alba)	Protected under an international agreement	Migratory	Yes	No	Yes	No
Cattle egret (Ardea ibis)	Protected under an international agreement	Migratory	No	No	Yes	No
Eastern great egret (Ardea modesta)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Eastern reef egret (Ardea sacra)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Australian bustard (Ardeotis australias)	Priority 4	N/A	Yes	Yes	N/A	Yes
Ruddy turnstone (Arenaria interpres)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Bush stone-curlew (Burhinus grallarius)	Priority 4	N/A	Yes	Yes	N/A	Yes
Sanderling (Calidris alba)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Red knot (north-eastern Siberia) Calidris canutus subsp. rogersi)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Sharp-tailed sandpiper (Calidris cuminate)	Protected under an international agreement	Migratory	Yes	Yes	No	No



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Curlew sandpiper (Calidris ferruginea)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Red-necked stint (Calidris ruficollis)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Great knot (Calidris tenuirostris)	Rare or likely to become extinct	Migratory	Yes	Yes	No	Yes
Greater sand plover (Charadrius leschenaultii)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Greater sand plover (mongolian) (Charadrius leschenaultii subsp. leschenaultii)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Lesser sand plover (Charadrius mongolus)	Rare or likely to become extinct	Migratory	Yes	Yes	No	Yes
Oriental plover (Charadrius veredus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	No
White-winged black tern (Chlidonias leucopterus)	Protected under an international agreement	Migratory	No	Yes	No	No
Eastern reef egret (Egretta sacra)	Protected under an international agreement	Migratory	No	Yes	No	No
Peregrine falcon (Falco peregrinus)	Other specially protected fauna	N/A	Yes	Yes	No	No
Oriental pratincole (Glareola maldivarum)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
White-bellied sea-eagle (Haliaeetus leucogaster)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Barn swallow (Hirundo rustica)	Protected under an international agreement	Migratory	No	No	Yes	Yes
Bar-tailed godwit (Limosa lapponica)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Bar-tailed godwit (<i>Limosa lapponica</i> subsp. <i>menzbieri</i>)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Southern giant petrel (Macronectes giganteus)	N/A	Endangered; Migratory	No	No	Yes	No
Rainbow bee-eater (Merops ornatus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Star finch (western) (Neochmia ruficauda subsp. subclarescens)	Priority 4	N/A	Yes	Yes	N/A	Yes
Eastern curlew (Numenius madagascariensis)	Rare or likely to become extinct	Migratory	Yes	Yes	Yes	Yes



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Little curlew (Numenius minutus)	Protected under an international agreement	Migratory	Yes	Yes	No	No
Whimbrel (Numenius phaeopus)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Wilson's storm petrel (Pluvialis squatarola)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Night parrot (Perzoporus occidentalis)	Rare or likely to become extinct	Endangered	No	Yes	No	No
Flock bronzewing (Phaps histrionica)	Priority 4	N/A	Yes	Yes	N/A	Yes
Lesser crested tern (Sterna bengalensis)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Caspian tern (Sterna caspia)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Roseate tern (Sterna dougallii)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Common tern (Sterna hirundo)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
White-winged black tern (Sterna leucoptera)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Fairy tern (Sterna nereis subsp. nereis)	Rare or likely to become extinct	Vulnerable	No	Yes	No	No
Lesser crested tern (Thalasseus bengalensis)	Protected under an international agreement	Migratory	Yes	No	Yes	Yes
Crested tern (Thalasseus bergii)	Protected under an international agreement	Migratory	Yes	Yes	No	No
Grey-tailed tattler (Tringa brevipes)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Wood sandpiper (<i>Tringa glareola</i>)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Common greenshank (Tringa nebularia)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Mammals						
Northern quoll (Dasyurus hallucatus)	Rare or likely to become extinct	Endangered	Yes	Yes	Yes	No
Short-tailed mouse (Leggadina lakedownesis)	Priority 4	N/A	Yes	Yes	N/A	No
Western barred bandicoot (Perameles bougainville)	Rare or likely to become extinct	Endangered	Yes	Yes	No	No
Little northern freetail-bat (Mormopterus Ioriae cobourgensis)	Priority 1	N/A	No	No	N/A	Yes



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Western pebble-mound mouse (<i>Pseudomys chapmani</i>)	Priority 4	N/A	Yes	Yes	N/A	Yes



APPENDIX 4

Fauna List



APPENDIX 4: Fauna List

This list of conservation significant terrestrial vertebrate species has been developed based upon the results of the desktop assessment.

Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Reptile						
Airlie Island skink (Ctenotus angusticeps)	Rare or likely to become extinct	Vulnerable	No	No	Yes	No
Pilbara olive python (<i>Liasis olivaceus</i> subsp. barroni)	Rare or likely to become extinct	Vulnerable	Yes	Yes	No	No
Keeled slider (NW coast Onslow to Barradale) (Lerista planiventralis)	Priority 1	N/A	Yes	Yes	N/A	No
Bird						
Common sandpiper (Actitis hypoleucos)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Fork-tailed swift (Apus pacificus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Great egret (Ardea alba)	Protected under an international agreement	Migratory	Yes	No	Yes	No
Cattle egret (Ardea ibis)	Protected under an international agreement	Migratory	No	No	Yes	No
Eastern great egret (Ardea modesta)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Eastern reef egret (Ardea sacra)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Australian bustard (Ardeotis australias)	Priority 4	N/A	Yes	Yes	N/A	Yes
Ruddy turnstone (Arenaria interpres)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Bush stone-curlew (Burhinus grallarius)	Priority 4	N/A	Yes	Yes	N/A	Yes
Sanderling (Calidris alba)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Red knot (north-eastern Siberia) Calidris canutus subsp. rogersi)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Sharp-tailed sandpiper (Calidris cuminate)	Protected under an international agreement	Migratory	Yes	Yes	No	No



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Curlew sandpiper (Calidris ferruginea)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Red-necked stint (Calidris ruficollis)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Great knot (Calidris tenuirostris)	Rare or likely to become extinct	Migratory	Yes	Yes	No	Yes
Greater sand plover (Charadrius leschenaultii)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Greater sand plover (mongolian) (Charadrius leschenaultii subsp. leschenaultii)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Lesser sand plover (Charadrius mongolus)	Rare or likely to become extinct	Migratory	Yes	Yes	No	Yes
Oriental plover (Charadrius veredus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	No
White-winged black tern (<i>Chlidonias</i> leucopterus)	Protected under an international agreement	Migratory	No	Yes	No	No
Eastern reef egret (Egretta sacra)	Protected under an international agreement	Migratory	No	Yes	No	No
Peregrine falcon (Falco peregrinus)	Other specially protected fauna	N/A	Yes	Yes	No	No
Oriental pratincole (Glareola maldivarum)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
White-bellied sea-eagle (Haliaeetus leucogaster)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Barn swallow (Hirundo rustica)	Protected under an international agreement	Migratory	No	No	Yes	Yes
Bar-tailed godwit (Limosa lapponica)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Bar-tailed godwit (<i>Limosa lapponica</i> subsp. <i>menzbieri</i>)	Rare or likely to become extinct	Migratory	Yes	Yes	No	No
Southern giant petrel (Macronectes giganteus)	N/A	Endangered; Migratory	No	No	Yes	No
Rainbow bee-eater (Merops ornatus)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Star finch (western) (Neochmia ruficauda subsp. subclarescens)	Priority 4	N/A	Yes	Yes	N/A	Yes
Eastern curlew (Numenius madagascariensis)	Rare or likely to become extinct	Migratory	Yes	Yes	Yes	Yes



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Little curlew (Numenius minutus)	Protected under an international agreement	Migratory	Yes	Yes	No	No
Whimbrel (Numenius phaeopus)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Wilson's storm petrel (Pluvialis squatarola)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Night parrot (Perzoporus occidentalis)	Rare or likely to become extinct	Endangered	No	Yes	No	No
Flock bronzewing (Phaps histrionica)	Priority 4	N/A	Yes	Yes	N/A	Yes
Lesser crested tern (Sterna bengalensis)	Protected under an international agreement	Migratory	Yes	Yes	Yes	Yes
Caspian tern (Sterna caspia)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Roseate tern (Sterna dougallii)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Common tern (Sterna hirundo)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
White-winged black tern (Sterna leucoptera)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Fairy tern (Sterna nereis subsp. nereis)	Rare or likely to become extinct	Vulnerable	No	Yes	No	No
Lesser crested tern (Thalasseus bengalensis)	Protected under an international agreement	Migratory	Yes	No	Yes	Yes
Crested tern (Thalasseus bergii)	Protected under an international agreement	Migratory	Yes	Yes	No	No
Grey-tailed tattler (Tringa brevipes)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Wood sandpiper (<i>Tringa glareola</i>)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Common greenshank (Tringa nebularia)	Protected under an international agreement	Migratory	Yes	Yes	No	Yes
Mammals					•	•
Northern quoll (Dasyurus hallucatus)	Rare or likely to become extinct	Endangered	Yes	Yes	Yes	No
Short-tailed mouse (Leggadina lakedownesis)	Priority 4	N/A	Yes	Yes	N/A	No
Western barred bandicoot (Perameles bougainville)	Rare or likely to become extinct	Endangered	Yes	Yes	No	No
Little northern freetail-bat (Mormopterus Ioriae cobourgensis)	Priority 1	N/A	No	No	N/A	Yes



Species	Conservation Status under WC Act	Conservation Status under EPBC Act	Identified by NatureMap Database	Identified by DPaW Database	Identified by EPBC Database	Recorded by Fauna Surveys
Western pebble-mound mouse (<i>Pseudomys</i> chapmani)	Priority 4	N/A	Yes	Yes	N/A	Yes