



Taroborah Coal Project

Appendix 19 – Aquatic Ecology Assessment





Taroborah Coal Project

Aquatic Ecology Assessment

Prepared for:
Shenhua International Group Pty Ltd

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LIST OF ABBREVIATIONS

°C	-	degrees Celsius
AARC	-	Australasian Resource Consultants
ANZECC	-	Australia and New Zealand Environment and Conservation Council
AUSRIVAS	-	Australian River Assessment System
CPP	-	Coal Preparation Plant
DAFF	-	Department of Agriculture, Fisheries and Forestry
DEEDI	-	Department of Employment, Economic Development and Innovation



DO	-	Dissolved Oxygen
EC	-	Electrical Conductivity
EHP	-	Department of Environment and Heritage Protection
EPBC Act	-	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
EPC	-	Exploration Permit for Coal
EPT	-	Ephemeroptera, Plecoptera and Trichoptera taxa
GDE	-	Groundwater dependent ecosystems
GPS	-	Global Positioning System
km	-	kilometre(s)
km ²	-	square kilometres
LP Act	-	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
m	-	metre(s)
MDL	-	Mineral Development License
mg/L	-	milligrams per Litre
ML	-	Mining Lease
mm	-	millimetre(s)
n/a	-	not assessed
NATA	-	National Association of Testing Authorities
NC Act	-	<i>Nature Conservation Act 1992</i>
NCWR	-	<i>Nature Conservation (Wildlife) Regulation 2006</i>
QEOP	-	<i>Queensland Environmental Offsets Policy 2014</i>
QGEOP	-	<i>Queensland Government Environmental Offsets Policy 2008</i>
Shenhua	-	Shenhua International Group Pty Ltd
SIGNAL	-	Stream Invertebrate Grade Number – Average Level
SPC	-	Specific Conductivity
SSBV	-	State Significant Biodiversity Value
TDS	-	Total Dissolved Solids

VM Act	-	<i>Vegetation Management Act 1999</i>
WONS	-	Weeds of National Significance

EXECUTIVE SUMMARY

Australasian Resource Consultants conducted an Aquatic Ecology Assessment of the Shenhua International Group Pty Ltd Taraborah Coal Project (the Project) in September 2011 and February 2012. This work constitutes one of the baseline studies required for the Project's Environmental Impact Statement.

Methodology

A total of 12 aquatic sites were assessed during each survey period to determine the overall condition of the available aquatic ecosystems within the Project site. Sampling sites were located in pastoral dams, lacustrine wetlands, palustrine wetlands and watercourses throughout the Project site. Water samples were taken where surface water was present. The results of surface water were compared to the Australia and New Zealand Environment and Conservation Council Guidelines for both aquatic ecosystems for 95% species protection levels and Livestock Drinking Water, where triggers exist for the analysed parameters.

Macro-invertebrate sampling of water bodies was undertaken and Stream Invertebrate Grade Number – Average Level bi-plots were constructed (based on the identification results), giving a broad scale measure of stream health based on the 'waterbug' pollution sensitivities.

Vertebrates were assessed, with trapping, spotlighting, and drag netting conducted, as well as incidental fauna observations. Habitat, vegetation and stream morphology were also assessed as per the Australian River Assessment Systems.

Results

The Project site contains two primary ephemeral drainage lines classified as watercourses; Retreat Creek (Stream Order 4) and Taraborah Creek (Stream Order 2). The Project site also contains several Stream Order 1 and 2 drainage lines that form tributaries to Retreat Creek and Taraborah Creek. The EHP Wetlands mapping indicates that two lacustrine wetlands and four palustrine wetlands occur on the Project site.

Results from the baseline surveying of water quality within the various water bodies located on the Project site shows that surface water exceeds the trigger values provided in the ANZECC (2000) Aquatic Ecosystems Guidelines at one or more sites for pH, dissolved oxygen, specific conductivity, total Nitrogen, total Phosphorus, Aluminium, and Chromium. No recorded levels exceeded the proposed trigger values provided in the ANZECC (2000) Livestock Drinking Water Guidelines.

A total of 47 macro-invertebrate taxa were identified during the aquatic ecology surveys. The Stream Invertebrate Grade Number – Average Level Index was developed by the National River Health Program as a tool for the bio-assessment of water pollution and looks at the taxonomic composition of the invertebrate assemblage to determine river 'health'. Once plotted on an objective bi-plot graph, an indication of types of pollution and other physical and chemical factors can be interpreted, and a basic estimate of river health can be determined. The bi-plot graph showed no sites fell within the "pristine" category of Quadrant 1. All dry season sampling sites fell within Quadrant 2, indicating that the aquatic ecosystem was slightly disturbed with high salinity or nutrient levels. However, these levels may be the result of natural influences. The majority of sites sampled during the wet season fell within Quadrant 4, suggesting that agricultural or industrial disturbances were impacting on these aquatic ecosystems.



However, the distinction between the wet and dry season survey results is most likely due to the ephemeral nature of the watercourses within the region and subsequent flooding experienced prior to the wet season survey.

It is generally accepted that three orders of macro-invertebrates, the Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) are most sensitive to disturbance (Marshall et al, 2001). The total number of families of these groups occurring at sites can be used to assess degradation of habitat and water quality. The use of Ephemeroptera, Plecoptera and Trichoptera taxa analysis is limited to regional comparisons, as the comparison of fauna varies between regions and larger river systems. No taxa belonging to the Plecoptera order were identified at any of the sampling sites. Ephemeropteran and Trichopterian individuals were recorded at the majority of the aquatic sites. Trichopterian individuals were more commonly encountered during the dry season survey.

Aquatic and riparian habitats on the Project site were found to support six fish species, five amphibians (one introduced), two reptiles, thirty-three birds (three of which are listed under the *Environment Protection and Biodiversity Conservation Act 1999* as Migratory), and ten mammal species. One mammal species of conservation significance – the Little Pied Bat (*Chalinolobus picatus*) – was detected by the AnaBat detector. The Little Pied Bat is listed under the *Nature Conservation Act (1992)* as Near Threatened.

One pest fauna species – the Cane Toad – was recorded during the aquatic site surveys. The Cane Toad is not listed as a declared species under the *Land Protection (Pest and Stock Route Management) Act 2002*.

No plants species listed under either the *Nature Conservation Act 1992* or *Environment Protection and Biodiversity Conservation Act 1999* were identified during the course of the survey. A total of thirty-four weed species, including three Class 2 State Declared species – Parthenium, Parkinsonia and Fireweed – were identified within riparian habitats. Furthermore, one Class 3 weed species – Lantana – and several weed species not declared under the LP Act were identified within the Project site. All four declared species are also listed as Weeds of National Significance.

Overall, aquatic habitats within watercourses on the Project site rate from moderate to good. In general, Retreat Creek and Taraborah Creek scored as good quality habitat, while some wetlands and pastoral dams scored lower, falling into the moderate category. These wetlands, pastoral dams and drainage lines were found to be either ephemeral or not flowing, lacking in aquatic habitat variability and/or showing indicators of bank instability (i.e. erosion and heavy deposits of fine materials).

Project Impacts

The following Project impacts upon local aquatic environmental values have been identified:

- Underground mining will result in limited land subsidence to the north of Capricorn Highway, and minor impacts upon both the first and second order ephemeral drainage lines that flow into Retreat Creek. Without remedial action, such impacts could include minor disturbance to and loss of aquatic habitat stability, small-scale dieback of riparian vegetation, temporary reduction in run-off flows and subsequent release of sediment (sediment deposition occurs at lower flow-rates due to a reduction in water column velocity and turbulence);
- Land subsidence will have limited impacts upon the Silver-leaved Ironbark Open Woodland (RE 11.3.6 – Community C6) located in the north of the Project site, with minor changes in both water flow direction / velocity and subsequent subtle alterations in local flora and fauna



habitats. Limited impacts may also arise for the smaller ephemeral drainages that are associated with terrestrial communities;

- Where watercourses cut across lines of subsidence, localised shallow depressions often form within watercourse beds, which increase the bed gradient and result in localised increases in water flow velocity and erosion. However, such depressions will be very shallow and within a few wet seasons it is anticipated that these depressions will fill with sediment and the associated environmental impacts decline. Since the affected watercourses are highly ephemeral in nature, it is unlikely that subsidence will have a significant impact upon the hydrological regime or erosion potential of local watercourses;
- Land subsidence will also subtly change the drainage-profile of local watercourses and may result in shallow ponded areas. Although most of the ponded areas would dry quickly following rainfall events, some ponded areas could provide additional habitat for Cane Toads. Subsidence impacts upon surface drainage and other sensitive landscape features will require the development and implementation of appropriate subsidence-management strategies, such as removing elevated crests of land which develop tangentially to drainage lines and temporarily impede water flow;
- Subsidence induced tension cracks within the bed / banks of any watercourse may lead to temporary watercourse dewatering and / or damage to tree roots. The rehabilitation of surface cracks is likely to require remedial earthworks and the use of sealants. Such works may cause temporary habitat disturbance due to access track development, establishment of drilling rigs, removal of riparian vegetation and the unplanned release of limited amounts of grouting material into local watercourses;
- The large dam located in the central west sector of the Project site may be impacted by subsidence. Such impacts may include cracking of dam embankments and changes to the extent and depth of the water body, due to the loss of dam water to near-surface groundwater. However, since the mined coal seam occurs 140 - 150 m below the surface water body, the loss of water from this dam (if any) may be temporary, unless the area is affected by severe geological disturbance (e.g. strong faulting), of which there is no indication from the exploration surveys completed to date;
- The modelled reduction in groundwater levels around Retreat Creek (approximately 5 m) and Taraborah Creek (approximately 30 m) that will occur during mining operations, may have an impact upon deep rooted Eucalypt trees which grow along both creeks, if groundwater forms part of their water supply. Vegetation which does not possess deep roots (shrub and groundcover plants) is not anticipated to be impacted by operational groundwater drawdowns; and
- The *Queensland Environmental Offsets Policy 2014* may be applicable to Regional Ecosystems within the defined distance from the defining banks of a watercourse impacted by subsidence from underground longwall mining (e.g. Community 6) if the impacts are permanent and cannot be managed. If permanent subsidence impacts persist at the end of the mine life, then offsets and ecological equivalence surveys will be considered, in order to address such post-mining subsidence impacts upon the local aquatic flora and fauna.



Recommendations

The surface water and sediment quality monitoring program instituted for this study should be continued throughout the Project life. Collection of this data will allow for future detection of any deviation from the 'normal' state of the Project site. This program will ensure the early detection and documentation of impacts, thereby allowing mitigation strategies to be altered or developed.

Any habitat clearing that may be required during subsidence remedial works should be conducted only after the areas to be cleared have been plainly delineated and identified to equipment operators and supervisors, and appropriate erosion and sediment control structures are in place.

A segment of the Staff Induction Program should be dedicated to informing staff of the conservation values on the Project site and surrounding areas to increase staff awareness of the species present. This could include photographs, brief descriptions and management requirements of native species.

A Pest Management Plan should be developed, to monitor the presence of pest plant and animal species within the Project site and monitor the success of implemented control strategies.

The following mitigation strategies have been developed for local aquatic communities that will be impacted by the Project:

- A Subsidence Management Plan will be developed in accordance with the requirements of the EHP guideline *Watercourse Subsidence – Central Queensland Mining Industry (DRAFT Version 7)*;
- Regular monitoring (in accordance with the requirements of a Subsidence Management Plan) throughout the underground mine life will be required for both watercourses and the lacustrine wetland located within the subsidence impact zone. Such monitoring is aimed at identifying subsidence-induced alterations to watercourse beds / banks, development of any necessary mitigation measures and helping to avoid long-term Project impacts;
- Where subsidence causes alteration to stream beds or banks, appropriate erosion controls should be implemented;
- Tension cracks which arise as a result of land subsidence will be identified during the monitoring process and rehabilitated via the application of remedial earthworks and, if necessary, crack sealants. Although tension cracks may not significantly impact local vegetation communities, the crack rehabilitation process may impact such communities and will therefore need to be managed appropriately;
- Guidance on the process of tension crack remediation should be included in the rehabilitation plan, in order to minimise impacts upon surrounding ecosystem values. Where local vegetation communities are disturbed during the tension crack repair process, they should be returned as far as possible to their pre-disturbance condition;
- Minor remedial drainage earthworks will be required for areas of subsidence-induced ponding in order to re-establish free drainage and ensure that any hydrological changes caused by subsidence do not lead to a reduction in the ecological function of these areas; and



- The large dam (artificial wetland) located in the central west of the Project site should be monitored for subsidence impacts such as embankment cracking or changes in the lateral extent or depth of this water body. Remedial earthworks should be implemented as required.

The rehabilitation strategy developed for the Project site should embody the concepts and recommendations presented above, and include provision for monitoring of rehabilitation progress over the life of the operation. The establishment of aquatic snags in riparian habitats should be included in the rehabilitation strategy where appropriate.

Additional recommendations for the Project include minimising disturbance areas and stabilising any disturbance adjacent to creeks as soon as possible.

1.0 INTRODUCTION

Australasian Resource Consultants Pty Ltd (AARC) was commissioned by Shenhua International Group Pty Ltd (Shenhua) to conduct an Aquatic Ecology Assessment of the proposed Taraborah Coal Project (the Project).

The Taraborah Coal Project proposes the extraction and export of thermal coal, utilising both underground and open-cut methods, in conjunction with the development of an onsite Coal Preparation Plant (CPP). The Project site is encompassed by Mineral Development Licence (MDL) 467.

To provide a comprehensive description of the watercourses and aquatic flora and fauna of the Project site, field surveys were conducted between the 26th and 30th September 2011 (dry season) and the 28th of February and 5th March 2012 (wet season).

1.1 OBJECTIVES

The main objectives of the Aquatic Ecology Assessment were as follows:

- Assess the aquatic ecology values currently present on site;
- Conduct an aquatic ecology database search and literature review;
- Undertake dry season and wet season aquatic ecology surveys;
- Utilise the field and analytical data to describe the aquatic environments on the Project site;
- Develop a qualitative risk assessment to identify and manage potential Project impacts upon sensitive aquatic species;
- Identify potential Project impacts upon the aquatic environment; and
- Develop suitable impact mitigation strategies in order to protect the aquatic environment.

1.2 SCOPE OF STUDY

To assess the ecological values of the watercourses on the Project site, the following scope of works was undertaken:

- Database searches prior to each survey, to identify species of conservation significance known from the region (the most recent results are provided in Appendix A). These searches enabled such species to be targeted during the field survey component of the study;
- Field surveys employing standard methodologies to describe stream morphology and determine the composition of aquatic flora and fauna species inhabiting the Project site, particularly species of conservation significance; and
- The preparation of a report to Shenhua describing the significant ecological features identified and outlining possible management strategies to reduce any foreseeable impacts associated with proposed mining activities.



2.0 PROJECT DESCRIPTION

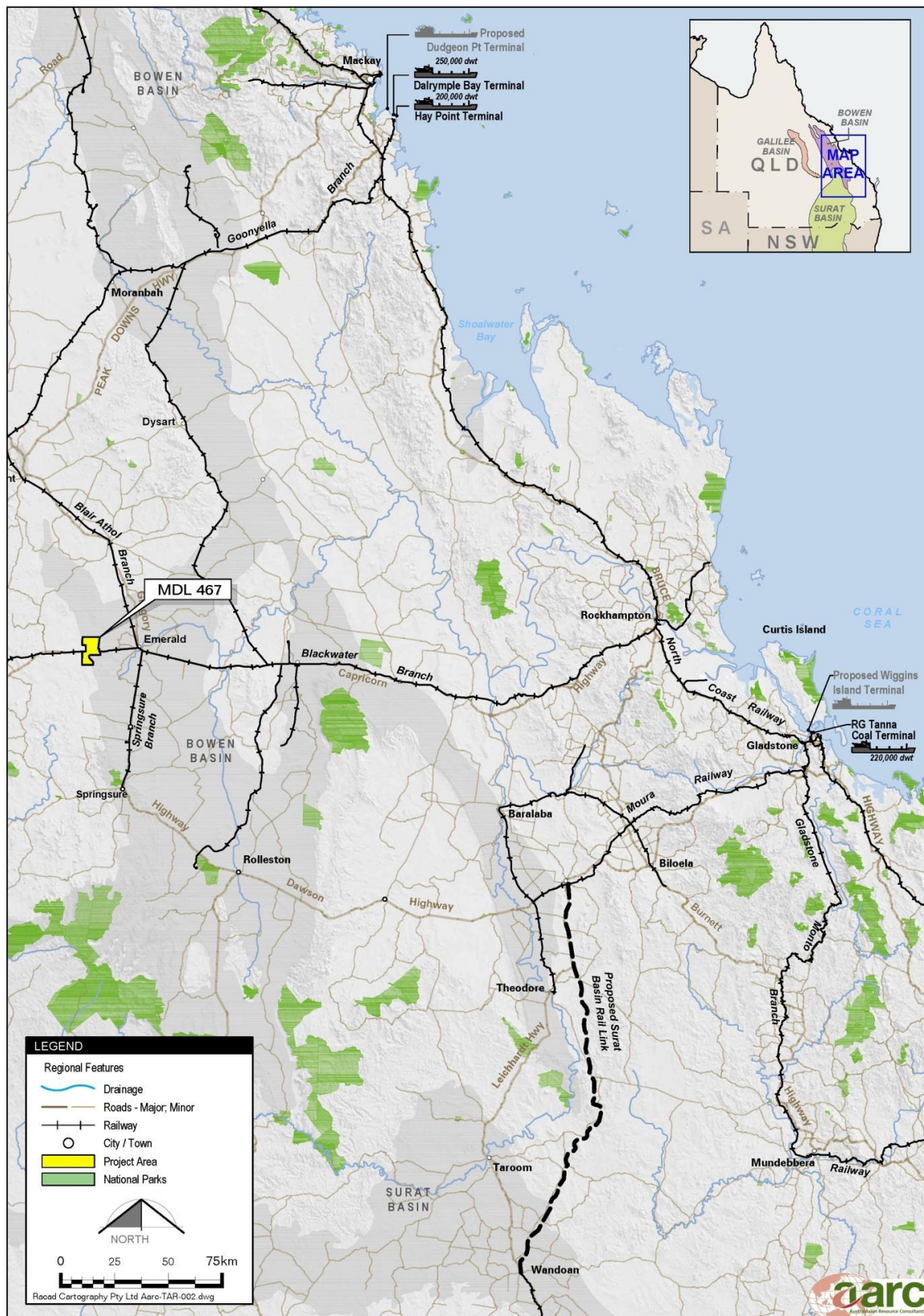
2.1 PROJECT LOCATION

The Project site is located in the Central Highlands District of Central Queensland, within Queensland's Bowen Basin, approximately 258 kilometres (km) east of Rockhampton and 286 km south-west of Mackay. The closest residential area to the Project is the township of Emerald, located approximately 22 km east of the Project site. The regional location of the Project site is shown in Figure 1. The Project site encompasses MDL 467 shown in Figure 2.

2.2 LOCAL TOPOGRAPHY AND WATERWAYS

The majority of the Project site is situated on undulating plains and hills, with a sandstone plateau to the far west. The Project site lies within the Fitzroy Basin catchment and is traversed by two primary ephemeral creeks and several associated drainage lines. Watercourses occurring on the Project site are shown in Figure 3. The main watercourse in the north of the Project site is Retreat Creek and in the south is Taroborah Creek. Both of these waterways flow in an easterly direction and ultimately flow into the Nogoa River, downstream of Fairbairn Dam or Lake Maraboon (refer to Figure 3). Surface water within the Project site is used for stock drinking water.





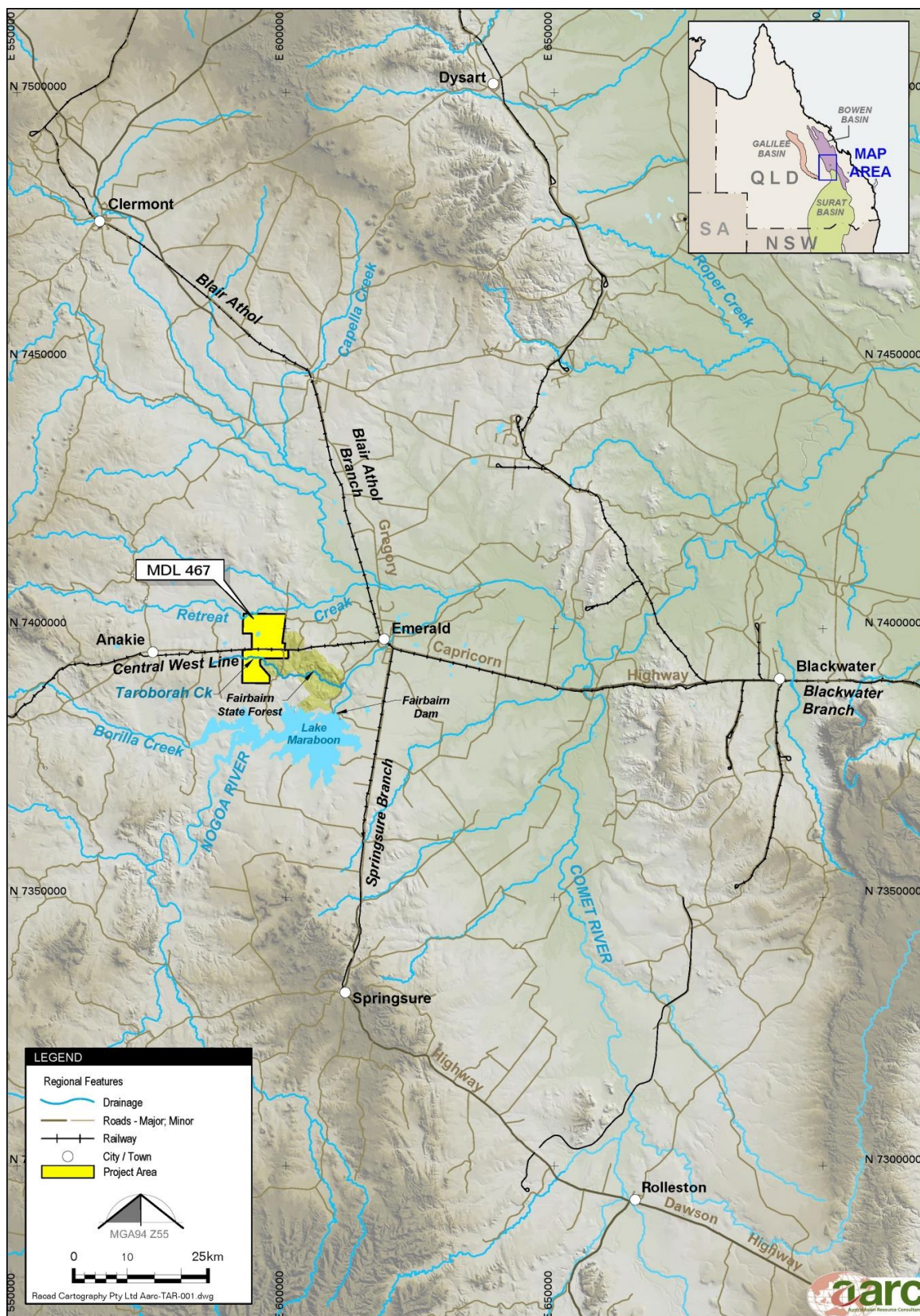


Figure 2 Local Project Location

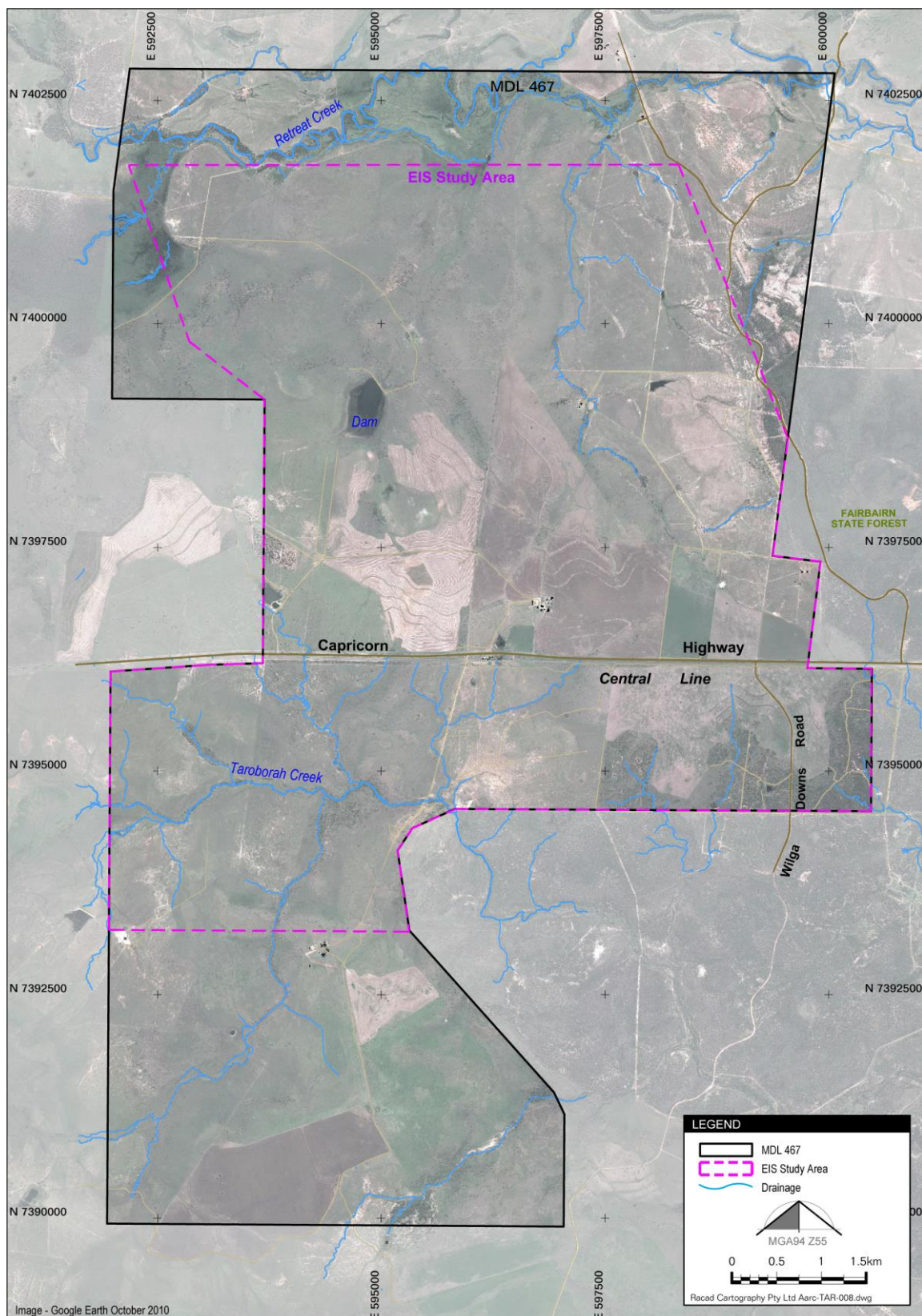


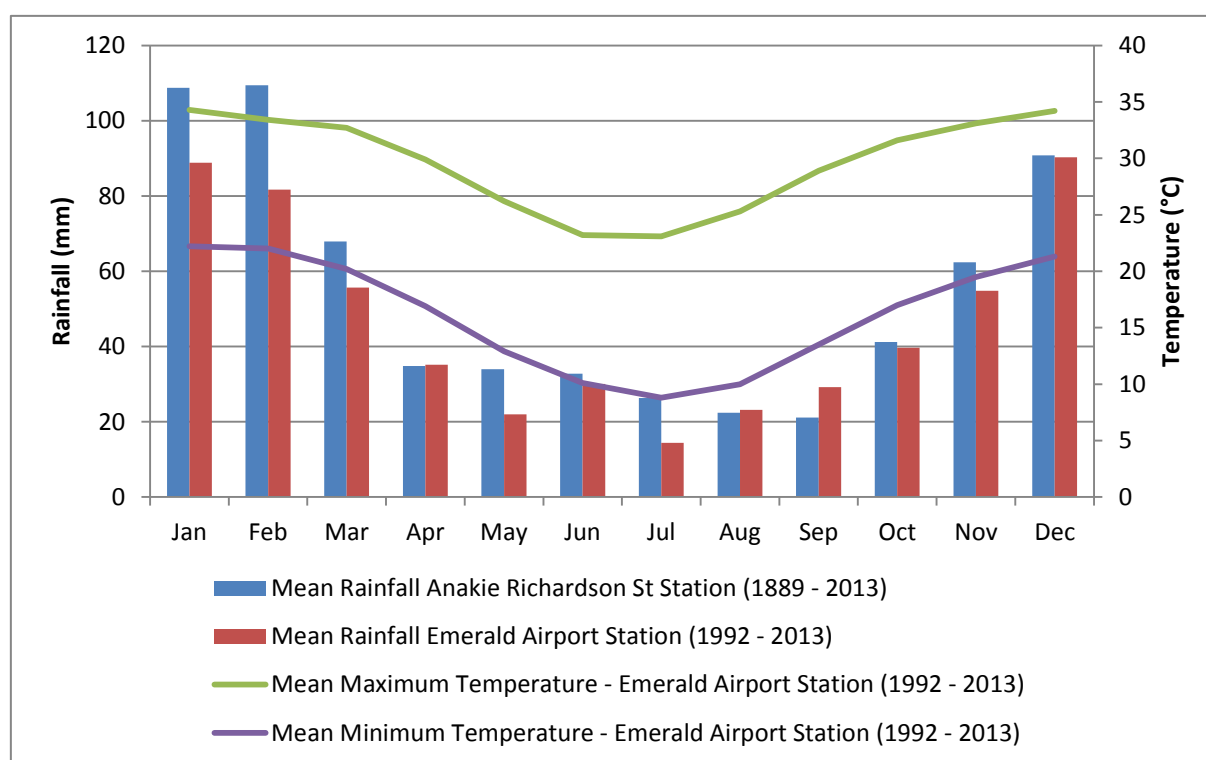
Figure 3 Watercourses on the Project Site

2.3 REGIONAL CLIMATE

The climatic description of the region in which the Project site is located has been compiled using the regional data collected by Australia Bureau of Meteorology (<http://www.bom.gov.au/>). Rainfall data is sourced from the Anakie Richardson St Station (Station 35001), located approximately 19.3 km west of the Project site. Data has been compiled at this station since 1889. As temperature data is not available from this station, temperature and additional rainfall data is sourced from the Emerald Airport Station (Station 035264), located approximately 24.6 km east-south-east of the Project site. Data from this station has been compiled since 1992.

Data trends indicate that mean annual rainfall for the region is between 650 mm (Anakie Station) and 559 mm (Emerald Airport Station). Figure 4 shows that rainfall is highly seasonal, with the dry season peaking between July and September and the wet season peaking from January through to February.

July is the coolest month with mean minimum temperature of 6.9 °C and mean maximum temperature of 22.4 °C, whilst December is the warmest month with a mean maximum temperature of 34.8 °C and a mean minimum temperature of 20.7 °C (Figure 4).



Source: BOM 2013

Figure 4 Rainfall and mean maximum and minimum daily temperatures for the Emerald-Anakie region

2.4 CONDITIONS PRIOR TO AND DURING THE SURVEY

Data sourced from the Bureau of Meteorology Emerald Airport Station shows that 1 mm of rain fell in the two months (August – September) prior to the commencement of the dry season survey (26th September 2011). Temperatures ranged from 3.1°C to 32.1°C over this period.

Data from the Emerald Airport Station revealed that a total of 93.8 mm of rain fell in the month leading up to the wet season survey. During the survey period a total of 0.8 mm of rain fell and temperatures ranged from 19.6°C to 34.8°C.

2.5 CURRENT LAND USE

Cropping and low intensity cattle grazing are the predominant land use activities on the Project site.



3.0 RELEVANT LEGISLATION

Legislation relevant to the assessment of aquatic flora, fauna and biodiversity on the Project site is discussed below.

3.1 QUEENSLAND NATURE CONSERVATION ACT 1992

The most relevant portions of the *Nature Conservation Act 1992* (NC Act) to the Project are the sections which pertain to Wildlife and Habitat Conservation. The classes of wildlife¹ to which the NC Act applies includes protected wildlife, which is defined as:

- Extinct wildlife;
- Endangered wildlife;
- Vulnerable wildlife;
- Near Threatened; and
- Least Concern wildlife.

Species listed under the above classes are published in the associated *Nature Conservation (Wildlife) Regulation 2006* (NCWR).

The NC Act defines 'threatening processes' as:

- a) Threatening the survival of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat; or
- b) Affecting the capacity of any protected area, area of major interest, protected wildlife, community of native wildlife or native wildlife habitat to sustain natural processes.

The NC Act is relevant to the Project should any flora or fauna species of conservation significance (as detailed in the NCWR) be found on the Project site.

3.2 COMMONWEALTH ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999

Under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), an action will require approval from the Federal Environment Minister if the action has, will have, or is likely to have a significant impact on a matter of National Environmental Significance. Matters of National Environmental Significance include:

- World Heritage properties;
- National Heritage Places;
- RAMSAR wetlands of international importance;

¹ Under the *Nature Conservation Act 1992*, 'Wildlife' is defined to be any taxon of an animal, plant, protista, prokaryote or virus.

- Nationally Threatened species and ecological communities;
- Migratory species protected under international agreements;
- Nuclear Actions;
- Great Barrier Reef Marine Park;
- Water Resources impacted by coal seam gas or large scale coal projects; and
- The Commonwealth marine environment.

In addition, the EPBC Act provides for the identification and listing of key threatening processes.

As listed threatened species and communities, avian species identified as Migratory and water resources affected by large scale coal projects were identified on the Project site, the Project has been referred under guidelines provided in the EPBC Act. These guidelines have been produced to assist industry and the public in interpreting the EPBC Act. The Project was referred to the Department of the Environment on the 18th January 2012. The referral decision was issued on the 20th February 2012. The referral decision was that the proposed action is a controlled action in which the Project will require assessment and approval under the EPBC Act before it can proceed. The referral decision determined that the Project will be assessed under the bilateral agreement with the Queensland government.

3.3 QUEENSLAND LAND PROTECTION (PEST AND STOCK ROUTE MANAGEMENT) ACT 2002

The objective of the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) is to consolidate, amend and provide laws for the management, control, prohibition, and regulation of the introduction, spread and keeping of certain plants and animals declared under the Act. The LP Act is relevant to the Project with regard to the control and management of declared pest plant (weed) and animal species.

3.4 QUEENSLAND ENVIRONMENTAL OFFSETS ACT 2014

The *Environmental Offsets Act 2014* establishes a framework for implementing environmental offsets to counteract significant residual impacts to prescribed environmental matters arising from particular activities, including mining developments. Matters of national, state and local significance are recognised as prescribed environmental matters under the Act. The Act provides for the Queensland Environmental Offsets Policy, detailed below.

3.4.1 Queensland Environmental Offsets Policy

The main purpose of the *Queensland Environmental Offsets Policy 2014* (QEOP 2014) is to protect the prescribed environmental matters where impacts will remain from development. Prescribed environmental matters include matters of national, state and local (where applicable) environmental significance. Offsets are required when an applicant has demonstrated that despite all efforts to avoid or minimise impacts on state significant biodiversity values there is still residual impact.

The QEOP 2014 outlines the following principles for the establishment of offsets:



1. Offsets will not replace or undermine existing environmental standards or regulatory requirements, or be used to allow development in areas otherwise prohibited through legislation or policy;
2. Environmental impacts must first be avoided, then minimised, before considering the use of offsets for any remaining impact;
3. Offsets must achieve a 'conservation outcome' that achieves an equivalent environmental outcome;
4. Offsets must provide environmental values as similar as possible to those being lost;
5. Offset provision must minimise the time-lag between the impact and delivery of the offset;
6. Offsets must provide additional protection to environmental values at risk, or additional management actions to improve environmental values; and
7. Where legal security is required, offsets must be legally secured for the duration of the impact on the prescribed environmental matter.

An assessment of matters of state environmental significance (MSES) is required to determine exactly what values will need to be incorporated into the offset(s). MSES relevant to aquatic ecology include:

- Endangered and Of Concern Regional Ecosystems (RE), as per the VM Act 1999 Status;
- Wetlands located in a Wetland Protection Area or shown as a High Ecological Significance Wetland on the Map of Referable Wetlands;
- RE located within the defining distance of a watercourse identified on the Vegetation Management Watercourse Map;
- RE intersecting an area identified as a wetland on the Vegetation Management Wetlands Map;
- RE containing areas that provide connectivity values necessary for ecosystem functioning. DEHP must be satisfied that the area of connectivity is of sufficient size or appropriate configuration to maintain ecosystem functioning; and
- Protected animals and plants under the NCWR 2006.

3.4.2 Watercourse Vegetation

Vegetation within a certain distance of each defining bank of a watercourse (depending on the stream order) is known to be important for preventing land degradation, and the loss of biodiversity and maintaining ecological processes. Appendix 4 of the QEOP 2014 stipulates the following distances from each high bank for ecological protection:

- Stream Order 1 and 2: distance of 25 m from each defining bank of the watercourse;
- Stream Order 3 and 4: distance of 50 m from each defining bank of the watercourse; and
- Stream Order 5 and greater: distance of 100 m from each defining bank of the watercourse.



Under the QEOP 2014, a RE located within the defined distance stipulated in Appendix 4 of the QEOP of a watercourse identified on the Vegetation Management Watercourse Map is a prescribed environmental matter.

Offsets for Watercourse Vegetation

The QEOP 2014 states that an offset for impacts to watercourse vegetation must be located within the same BVG and the same bioregion as the impacted RE.

4.0 DATABASE SEARCH

Database searches have collated information on flora and fauna species identified in the region from previous surveys, community records and other sources. A review of such databases facilitated the formulation of specific field survey techniques aimed at targeting certain flora and fauna species, vegetation communities and habitat types known from the region.

The following databases were searched for historical records of flora and fauna within the vicinity of the Project site that have habitat requirements intrinsically linked to aquatic habitats:

- EPBC Act Online Database: This database provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act for a nominated area; and
- Wildlife Online Database (Department of Environment and Heritage Protection (EHP): This database uses records collected from previous surveys, including the Queensland Museum surveys, as well as records from the public. While screening of data occurs, incorrect identifications are possible.

The results of these database searches revealed that several flora and fauna species of conservation significance with habitat requirements intrinsically linked to aquatic systems are known from the Emerald-Anakie region. For the purposes of the Wildlife Online database search, the 100 x 100km search area was defined by the points 23.0953 S, 147.4747 E, 23.9978 S, 147.4747 E, 23.9978 S 148.4992 E and 23.0953 S 148.4992 E. A 100 km x 100 km search area based on a Project site centroid of Latitude: 23.0953 and Longitude: 147.943 was employed in generating the EPBC Act Protected Matters Report. The area of interest for each database search is shown in Figure 5.

Database search results are included in Appendix A.

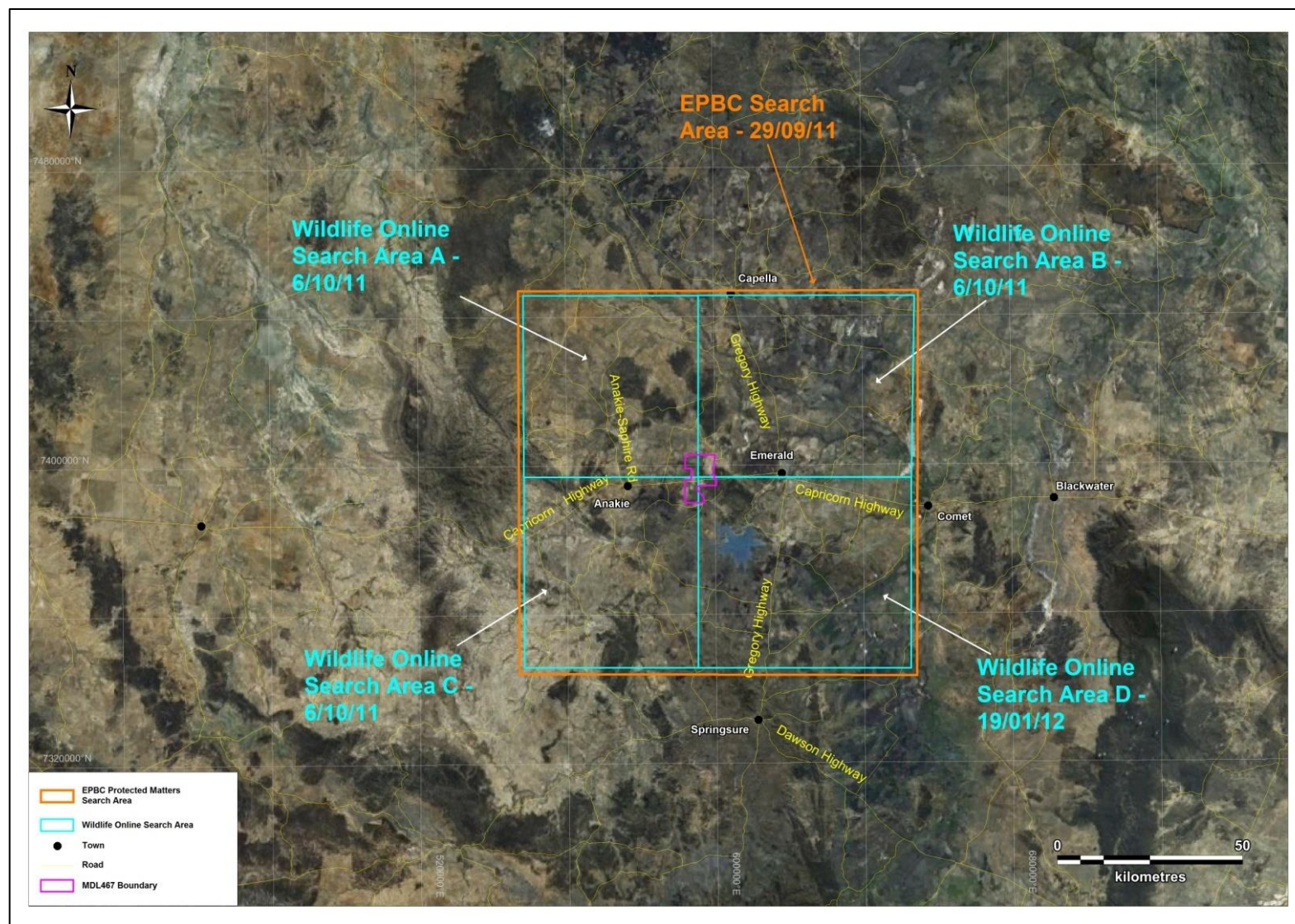


Figure 5 Database Search Area Summary

4.1 FLORA

A review of the databases and previous surveys conducted in the region indicate a number of flora species of conservation significance; three of which are associated with, or have been previously recorded within, aquatic habitats. These species are listed in Table 1 below.

Table 1 Rare and Threatened Aquatic or Riparian Flora known from the Region

Scientific Name	Conservation Status	
	EPBC Act	NC Act
<i>Cymbonotus maidenii</i>	Not Listed	Endangered
<i>Cyperus clarus</i>	Not Listed	Vulnerable
<i>Marsdenia brevifolia</i>	Vulnerable	Vulnerable

Source: Various databases 2012

Weeds of national significance (WONS), along with other introduced plants considered by the State to pose a significant threat to biodiversity, were included in the EPBC Act database search. These species are summarised in Table 2 below.

Riverine areas are known to be an important dispersal corridor for weeds, as these areas create ideal conditions for many weeds to extend their range and invade new areas. Most common scenarios which contribute towards weed invasion are water transport of seeds downstream along watercourses, stock and other wildlife transport of seeds in their digestive system or coat or eroded or exposed areas of soil providing opportunities for new weed infestations by reducing competition from existing native plants.

The WONS program coordinates the national effort against 20 of Australia's worst invasive plants. A national strategy for each WONS nominated weed specifies actions to better manage each weed. The Australian Government initiated program funding with commitments from state agencies and collaborative arrangements with other stakeholders. State legislation includes the LP Act, which classes weeds from Class 1 – 3. Class 2 pests are established in Queensland and have, or could have, an adverse economic, environmental or social impact. Declaration under the LP Act imposes a legal responsibility for control by all landowners on land under their management.

Table 2 Weed Species Identified in Database Searches

Scientific Name	Common Name	Preferred Habitat	Conservation Status	
			Commonwealth	State
<i>Acacia nilotica</i> subsp. <i>indica</i>	Prickly Acacia	Mitchell grass plains most commonly infested, potential to invade Project region	WONS	Class 2



Scientific Name	Common Name	Preferred Habitat	Conservation Status	
			Commonwealth	State
<i>Cryptostegia grandiflora</i>	Rubber Vine	Initially invades waterways, expanding outward to hillsides and pastures. Rubber Vine is established throughout most of Queensland, including north west Qld	WONS	Class 2
<i>Hymenachne amplexicaulis</i>	Hymenachne	Semi-aquatic grass which can thrive in waters up to 2 m deep. Potential to invade Project region	WONS	Class 2
<i>Lantana camara</i>	Lantana	Forms impenetrable thickets that take over native bushland and pastures	WONS	Class 2
<i>Opuntia stricta</i>	Prickly Pear	A bushy spreading plant to 1.5m often forming small to large clumps.	WONS	Class 2
<i>Opuntia tomentosa</i>	Velvety Tree Pear	A tree sized plant growing to 5m high with a central woody trunk. It is generally found as small clumps of trees or as scattered trees.	WONS	Class 2
<i>Parkinsonia aculeata</i>	Parkinsonia	Adapted to a wide range of soil types, found along water courses in sub-humid and semi-arid areas of Qld	WONS	Class 2
<i>Parthenium hysterophorus</i>	Parthenium	Invades pastures, disturbed areas along roadsides, watering points and cattle yards, grows in most soil types, most dominant in alkaline, clay and loam soils. Smaller outbreaks in north west Qld, with state level initiative to control	WONS	Class 2
<i>Schinus terebinthifolius</i>	Broadleaved Pepper Tree	Broadleaved pepper tree is a garden escapee that is invading coastal dune lands, wetlands and stream banks.	-	Class 3
<i>Tamarix aphylla</i>	Athel Pine	Athel pine forms dense stands along inland rivers. This weed consumes water more quickly than native plants, inhibits the establishment of native grasses, alters river flow patterns and causes bank erosion.	WONS	Class 3

Source: Australian Gov 2012



4.2 FAUNA

Literature and database searches indicate that fifteen fauna species of conservation significance which require aquatic habitats and / or feed exclusively within aquatic habitats have been identified in the region. These species are listed in Table 3 below.

Table 3 Rare and Threatened Aquatic or Riparian Fauna known from the Region

Scientific Name	Common Name	Conservation Status	
		EPBC Act	NC Act
Birds			
<i>Ephippiorhynchus asiaticus</i>	Black-necked Stork	Not Listed	Near Threatened
<i>Erythrotriorchis radiatus</i>	Red Goshawk	Vulnerable	Endangered
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Vulnerable	Vulnerable
<i>Melithreptus gularis</i>	Black-chinned Honeyeater	Not Listed	Near Threatened
<i>Neochmia ruficauda ruficauda</i>	Star Finch (eastern)	Endangered	Endangered
<i>Nettapus coromandelianus</i>	Cotton Pygmy-goose	Not Listed	Near Threatened
<i>Phaethon rubricauda</i>	Red-tailed Tropicbird	Not Listed	Vulnerable
<i>Rostratula australis</i>	Australian Painted Snipe	Vulnerable	Vulnerable
<i>Tadorna radjah</i>	Radjah Shelduck	Not Listed	Near Threatened
Mammals			
<i>Chalinolobus picatus</i>	Little Pied Bat	Not Listed	Near Threatened
Reptiles			
<i>Denisonia maculata</i>	Ornamental Snake	Vulnerable	Vulnerable
<i>Hemiaspis damelii</i>	Grey Snake	Not Listed	Endangered
<i>Rheodytes leukops</i>	Fitzroy River Turtle	Vulnerable	Vulnerable
Amphibians			
<i>Cyclorana verrucosa</i>	Rough Collared Frog	Not Listed	Near threatened
Fish			
<i>Maccullochella peelii</i>	Murray Cod	Vulnerable	Not Listed

Source: Various databases 2012



A further eleven species listed under the EPBC Act as 'Migratory' and/or 'Marine Overfly' that have habitat requirements linked to aquatic areas were identified in the database searches. These are shown in Table 4 below.

Table 4 Migratory and Marine Aquatic or Riparian Birds known from the Region

Scientific Name	Common Name	Migratory Species			Listed Marine Species
		Migratory Marine Species	Migratory Terrestrial Species	Migratory Wetlands Species	
<i>Anseranas semipalmata</i>	Magpie Goose	-	-	-	X
<i>Apus pacificus</i>	Fork-tailed Swift	X	-	-	X
<i>Ardea alba</i>	Great Egret	X	-	X	X
<i>Ardea ibis</i>	Cattle Egret	X	-	X	X
<i>Gallinago hardwickii</i>	Latham's Snipe	-	-	X	X
<i>Haliaeetus leucogaster</i>	White-bellied Sea Eagle	-	X	-	X
<i>Hirundapus caudacutus</i>	White-throated Needletail	-	X	-	X
<i>Merops ornatus</i>	Rainbow Bee-eater	-	X	-	X
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	-	X	-	X
<i>Nettapus coromandelianus albipennis</i>	Australian Cotton Pygmy-goose	-	-	X	X
<i>Rostratula benghalensis</i>	Painted Snipe	-	-	X	X

Source: Protected Matters Search Tool 2012

4.3 WETLAND HABITATS

A review of the EHP interactive WetlandMaps (2009) database (<http://www.epa.qld.gov.au/wetlandinfo/site/MappingFandD/WetlandMapsAndData.html>) revealed the presence of several lacustrine and palustrine water bodies within the Project site (Figure 6). None of these water bodies are outlined within the Environmentally Sensitive Areas (ESAs) mapping for the Project area, despite the close association between Endangered Regional Ecosystems (EREs) and the palustrine wetlands in the north. The EREs located on site are described and assessed within the Taraborah Terrestrial Flora and Fauna Report.

Lacustrine wetlands are wetlands and deep water habitats situated in topographic depressions, dammed river channels, or artificial water bodies i.e. lakes. Palustrine wetlands are wetlands dominated by persistent emergent vegetation i.e. vegetated swamps. The locations of these wetlands are shown in Figure 6.

Wetland habitat mapping conducted during the field survey involved ground-truthing of wetland environments as mapped by EHP, with a focus on the Lacustrine wetlands and larger palustrine wetlands.

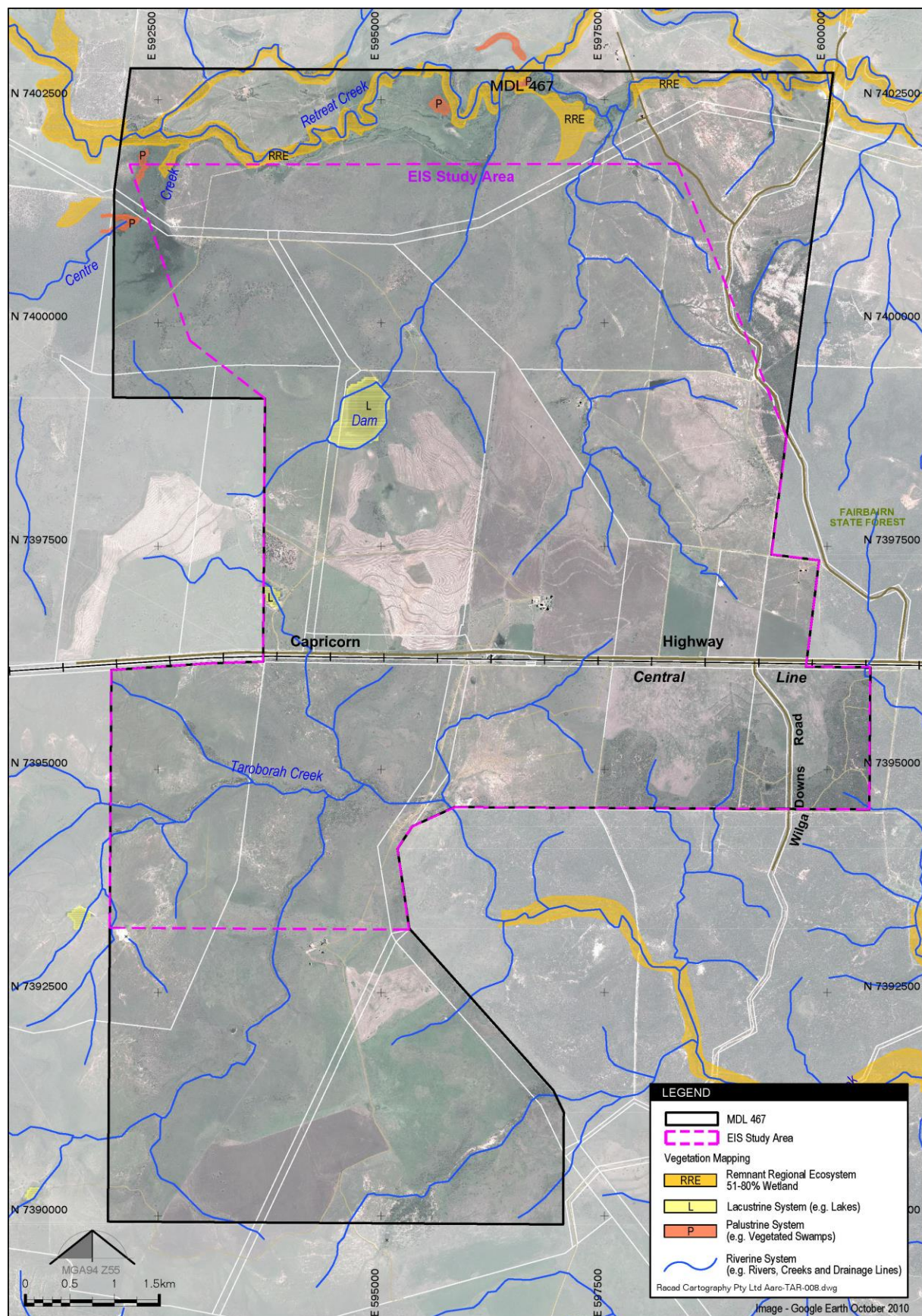


Figure 6 EHP Mapped Wetlands of the Project Area



5.0 SURVEY METHODOLOGY

5.1 SURVEY TIMING

Field surveys of aquatic flora and fauna were undertaken between 26th – 30th September 2011, and between 28th February – 5th March 2012. In addition, surface water and sediment quality sampling was conducted on a further five occasions following the initial two surveys; June 2012, October 2012, November 2012, December 2012 and January 2013.

The survey methods are discussed in Section 5.2. Survey sampling sites are shown in Figure 7 below.

5.2 FIELD SURVEY METHODS

5.2.1 Initial Site Scoping

Site scoping was conducted using two methods. Firstly, aerial photography and topographic maps of the Project site were reviewed to gain an overall perspective of the location of watercourses, and the direction of water flow.

Secondly, accessible areas of the Project site were broadly surveyed from a vehicle. This allowed for the targeting of upstream, midstream, and downstream locations, as well as habitats potentially occupied by species of conservation significance.

5.2.2 Surface Water Quality Sampling

At each site where surface water was available, in situ recordings of pH, Electrical Conductivity (EC), and temperature within the water body was taken. Surface water samples were collected from each site where sufficient water was available, immediately refrigerated and sent to a National Association of Testing Authorities (NATA) accredited lab for analysis of the following parameters:

- | | |
|--------------------------------|-------------|
| • Total Dissolved Solids (TDS) | • Aluminium |
| • Total Nitrogen | • Uranium |
| • Total Phosphorous | • Arsenic |
| • Nitrate | • Beryllium |
| • Sulphate | • Cadmium |
| • Fluoride | • Chromium |

Care was taken when obtaining samples that the sediment within the water body was not disturbed.

A total of six sites contained sufficient surface water during the initial dry season survey to allow for samples to be obtained and analysed. During the initial wet season survey, eleven sites contained sufficient surface water for samples to be obtained and analysed.

Two further dry season sampling events and three further wet season sampling events were undertaken, with generally the same sites containing sufficient water for collecting samples in the wet and dry seasons as the initial surveys.



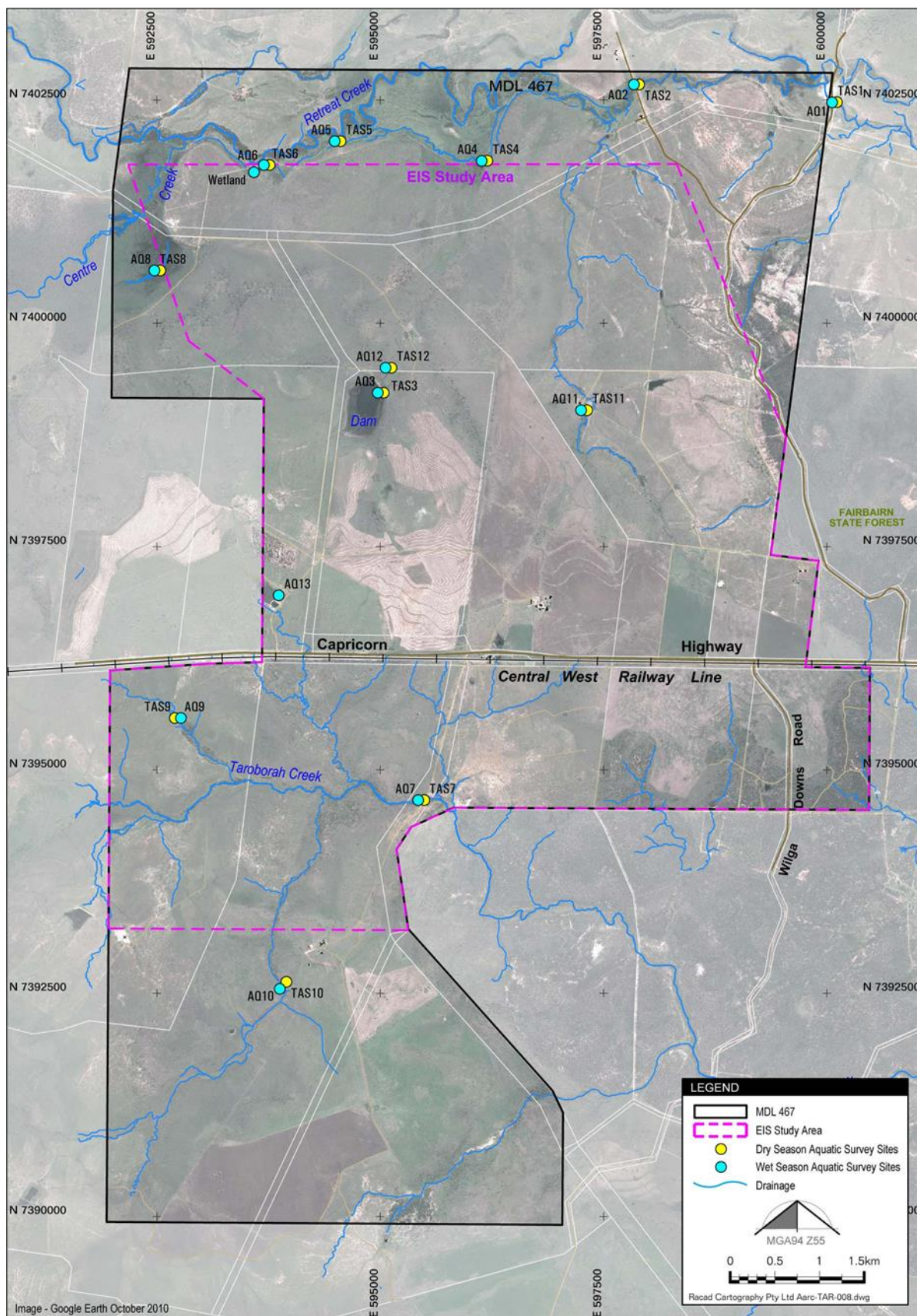


Figure 7 Aquatic Survey Sampling Locations



5.2.3 Stream Sediment Sampling

Stream sediment sampling was undertaken in watercourses potentially affected by the Project. Sediment samples were obtained from all survey sites sampled during the dry season and wet season surveys (refer to Figure 7). At least 10 sub-samples of the stream-bed substrate were taken at different locations along a 50m stretch of each creek or river bed. The sub-samples were then mixed to obtain a composite sample, sealed in sterilised glass jars and sent to a National Association of Testing Authorities (NATA) accredited laboratory for analysis of the parameters outlined in Table 5.

Results were compared to the ANZECC Guidelines (2000) for Fresh and Marine Water Quality Trigger Values as detailed below in Table 5. Due to the limited amount of data in Australia and New Zealand, these trigger levels have been based on the best available data from overseas.

Table 5 ANZECC (2000) Stream Sediment Trigger Values

Parameter	Units	ANZECC (2000) Stream Sediment (low) Triggers	ANZECC (2000) Stream Sediment (high) Triggers
Arsenic (As)	mg/kg	20	70
Silver (Ag)	mg/kg	1.0	3.7
Barium (Ba)	mg/kg	n/a	n/a
Beryllium (Be)	mg/kg	n/a	n/a
Cadmium (Cd)	mg/kg	1.5	10
Cobalt (Co)	mg/kg	n/a	n/a
Chromium (Cr)	mg/kg	80	370
Copper (Cu)	mg/kg	65	270
Iron (Fe)	mg/kg	n/a	n/a
Mercury (Hg)	mg/kg	0.15	1.0
Manganese (Mn)	mg/kg	n/a	n/a
Molybdenum (Mo)	mg/kg	n/a	n/a
Nickel (Ni)	mg/kg	21	52
Lead (Pb)	mg/kg	50	220
Selenium (Se)	mg/kg	n/a	n/a
Zinc (Zn)	mg/kg	200	410

5.2.4 Aquatic and Riparian Vegetation Identification

At each of the sites surveyed, a brief description of the riparian vegetation was recorded. Where in-stream flora was observed, it was also identified, and dominance recorded.

5.2.5 Macro-invertebrate Sampling

Macro-invertebrates are invertebrates that can be seen with the naked eye. The macro-invertebrate assemblage of an aquatic environment can be used as a biological indicator of the health of that environment, as macro-invertebrates are:

1. Generally sensitive to the cumulative impacts of a wide range of disturbances and pollutants;
2. Abundant in freshwater systems;
3. Relatively easy to identify; and
4. Easy to collect (Chessman, 2003).

The shallows of the water bodies at five sites were kick-sampled (disturbing the stream bed and passing a D-frame net with a 100 micrometre (μm) mesh-size through the resulting plume, along 5-10 m sections of the water body). Various microhabitats within the stream were targeted. All macro-invertebrates sampled over a 20 minute period were placed in a preservative solution and identified to family or sub-family level. Samples collected during the September 2011 survey were identified by FRC Environmental. Samples collected during the March 2012 survey were identified by ALS Water Sciences Group.

5.2.6 Aquatic Vertebrate Fauna Sampling

The aquatic vertebrate composition of each survey site was tested using three methods: drag netting, baited traps and spotlighting. These methods are explained below:

5.2.6.1 Drag Netting

The water body at each survey site in which vertebrate fauna sampling was undertaken was swept using a 25 mm mesh-size drag net strung between two people as they walked slowly up sections of the water body. This method allows large sections of the watercourse to be sampled; however snags and benthic debris can allow fish to avoid the net. Watercourses too narrow / shallow to allow the net to extend were excluded from drag netting. A total of four sites were drag netted over the course of the September 2011 survey. No drag netting was completed during the wet season survey as it was deemed unsuitable for those sites containing sufficient water. The flow of water was considered too deep, fast and/or wide with no safe locations to drag the net from.

5.2.6.2 Baited Traps

Opera-house and box traps were used at each site where trapping was to be undertaken to target carnivorous species. Traps were baited with either dry dog biscuits or bones to lure fish and other vertebrates into the traps. At each site where trapping was undertaken during the dry season survey, four traps of each type were left out for three nights each. During the dry season survey, four sites were trapped over three nights, resulting in a total of 96 trap nights. At each site where trapping was undertaken during the wet season survey, five traps of each type were left out for four consecutive nights. During this survey, four sites were trapped over four nights, resulting in a total of 160 trap



nights. All traps were checked and emptied at first light. All animals captured were identified, their abundances recorded, and then released back into the water.

5.2.6.3 Spotlighting

Spotlighting was carried out at night along various sections of the water bodies in an attempt to observe nocturnal wildlife that are less likely to be detected by other survey methods, such as frogs and reptiles. Spotlighting was conducted over a total period of four person hours within the Project site during the September 2011 survey. A total of ten person hours was spent spotlighting during the March 2012 survey.

5.2.7 Habitat Assessment

A habitat assessment was performed at selected sites using a modified version of the Australian River Assessment System (AUSRIVAS) protocols developed by the Department of Natural Resources and Mines (Conrick and Cockayne 2001). AUSRIVAS is a nationally standardised method for giving an assessment of the biological health of inland rivers within Australia. Each surveyed site was given a score out of 135, with higher numbers indicating favourable habitats normally associated with healthy waterways. Habitat assessments were conducted at a total of 12 sites during the dry season and wet season surveys. Refer to Table 7 and Section 5.3.3 for further details.

The level of assessment undertaken at each site is summarised in Table 6. Sites sampled during the dry season survey (TASX) were repeated during the wet season survey. While the sampling sites were renamed (AQX) the numbers assigned to each site were maintained for consistency.

Table 6 Level of Assessment at each Survey Location

Site	Water Sample Taken	In Situ Water Reading	Sediment Sample Taken	Macro-Invertebrate Sample Taken	Drag – Netting Conducted	Trapping Conducted	Habitat Assessment
Dry Season							
TAS1	-	-	X	-	-	-	X
TAS2	-	-	X	-	-	-	X
TAS3	X	X	X	X	X	X	X
TAS4	X	X	X	X	X	X	X
TAS5	X	X	X	-	-	-	X
TAS6	X	X	X	X	X	X	X
TAS7	-	-	X	-	-	-	X
TAS8	-	-	X	-	-	-	X
TAS9	-	-	X	-	-	-	X
TAS10	X	X	X	X	-	-	X
TAS11	X	X	X	X	X	X	X
TAS12	-	-	X	-	-	-	X

Site	Water Sample Taken	In Situ Water Reading	Sediment Sample Taken	Macro-Invertebrate Sample Taken	Drag – Netting Conducted	Trapping Conducted	Habitat Assessment
Wet Season							
AQ1	X	X	X	X	-	X	X
AQ2	X	X	X	X	-	X	X
AQ3	X	-	X	X	-	-	X
AQ4	X	X	X	X	-	-	X
AQ5	X	X	X	X	-	-	X
AQ6	X	X	X	X	-	-	X
AQ7	X	X	X	X	-	X	X
AQ8	X	X	X	X	-	-	X
AQ9			X		-	-	X
AQ10	X	X	X	X	-	-	X
AQ11	X	X	X	X	-	-	X
AQ13	X	X	X	X	-	X	X

5.3 DATA ANALYSIS

5.3.1 Surface Water Quality

Results of the analysis conducted on the surface water samples obtained in the field were compared to ANZECC (2000) Guidelines for both Aquatic Ecosystems for 95% species protection levels and Livestock Drinking Water, where triggers exist for the analysed parameters.

5.3.2 Macro-Invertebrate Sampling

The list of macro-invertebrate species identified from the Project site was analysed for the presence / absence of “EPT” taxa. The EPT group of macro-invertebrates – Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddies flies) – are three orders of insects that are especially sensitive to disturbance. Generally, there are more EPT species in areas of higher water quality and available habitat than in degraded water bodies. When this information is examined in conjunction with other data such as Stream Invertebrate Grade Number – Average Level (SIGNAL) Scores, water quality measurements, etc., a basic estimate of river health can be determined.

The SIGNAL Index was developed by the National River Health Program as a tool for the bio assessment of water pollution, and looks at the taxonomic composition of the invertebrate assemblage to determine river ‘health’. Each macro-invertebrate is given a grade number between 1 and 10 based on their sensitivity to various pollutants (Chessman, 2003), with a lower number indicating a higher tolerance to a range of conditions. The SIGNAL Index value is calculated by averaging the pollution sensitivity grade numbers of the families present at each site, and plotting them. Crustaceans captured in the baited traps do not contribute to the SIGNAL scoring process. This is due to the catch-release nature of the trapping methodology, which allows for individuals to be recaptured, thereby preventing the accurate calculation of catch numbers over a given timeframe.

Once the SIGNAL 2 scores have been calculated for each sampling site, the scores are plotted against the number of families found at that site. The position of a particular site on the bi-plot can provide an indication of the level of pollution and other physical and chemical factors that affect macro-invertebrate communities (Chessman, 2003) (refer to Figure 8 below for bi-plot interpretation).

<p>Quadrant 3</p> <p>Often indicating toxic pollution or harsh physical environments</p>	<p>Quadrant 1</p> <p>Indicates favourable habitat or chemically dilute water</p>
<p>Quadrant 4</p> <p>Usually indicating urban, industrial, or agricultural pollution</p>	<p>Quadrant 2</p> <p>Often indicating high salinity or nutrient levels (may be natural)</p>

Source: SIGNAL Index 2003

Figure 8 SIGNAL 2 Bi-Plot Interpretation

5.3.3 Habitat Assessment

Table 7 below provides a framework for interpreting habitat assessment scores.

Table 7 Examples of interpretations of AUSRIVAS Habitat Assessment scores

Habitat Assessment Score	Interpretation
0 – 35	Habitat is poor. There is limited habitat availability for in-stream fauna. There is little variation in velocity and depth of water, and the creek bed consists of a single sediment type. The water body typically consists of a small, shallow pool. Streamside vegetation, if present, consists of grasses and sedges. There is moderate to significant erosion on the banks.
36 – 70	Habitat variety is moderate. This could be due to leaf litter and other vegetation or detritus in the water, or the presence of boulders and rocks. The streamside vegetation consists mainly of grasses and sedges. There is moderate evidence of bank erosion, and the percentage of vegetative cover on the banks is less than 50%.
71 – 100	Habitat is relatively good. The bank is stable, there is variety in depth and velocity within the water body and substrate type is variable and tending towards boulders and rocks. Streamside vegetation is of trees and shrubs, adding to the bank stability. The percentage of streamside

Habitat Assessment Score	Interpretation
	cover by vegetation is relatively high.
101 – 135	Indicates a pristine and favourable habitat. There is no bank erosion and the dominant vegetation is trees. There is great variety in depth and velocity, and the habitat is quite complex, offering many types of protection for fauna. This is usually afforded by logs and branches, leaf litter, variety in substrate type, variety in water depth, and presence of vegetation living within the water body.

Source: AUSRIVAS 2012

5.3.4 Stream Morphology

To ensure that waterways of various sizes (i.e. stream orders) were sampled, a hierarchical ordering system was used (Conrck and Cockayne 2001). A second order stream is formed by the joining of two first order-streams, the junction of two second order streams forms a third order stream, and so on. Where two streams of different orders join, the larger stream order is assigned to the resulting stream. Stream orders have been defined based on the watercourse maps for the Emerald region made available by the Queensland Government Information Service. This system is illustrated in Figure 9.

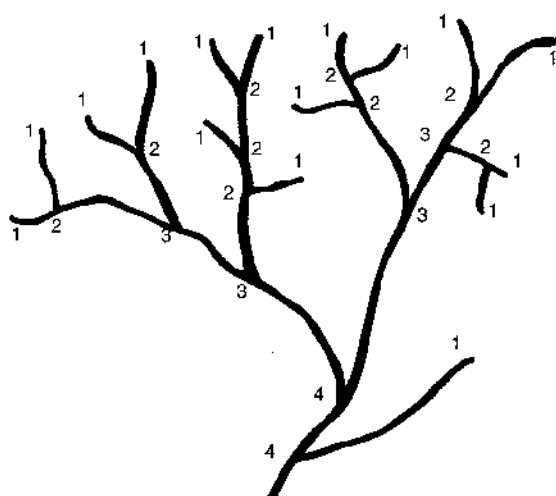


Figure 9 Method of Determining Stream Order

The Project site contains primarily small, narrow first order streams. Larger waterways (fourth and second order streams) exist in the north and south of the Project site.

Morphology data was collected by taking cross-sections of the watercourses. At each cross-section, the following details were noted:

- Depth of channel;
- Width of channel;
- Slope of banks;
- Stability of banks;
- Stream substrate type including a sediment sample;
- Details of water (if present) including colour, depth and a sample;
- Overhangs;
- Debris and tree roots; and
- Vegetation either within the channel or on the banks (i.e. the surrounding vegetation).

In addition, photographs were taken of the water channel cross-section described. These locations were recorded using GPS data and this arrangement will allow for direct comparison between this survey and any future monitoring activities.

6.0 RESULTS AND DISCUSSION

A total of 13 sites were assessed for various elements of the aquatic survey. The results of each are provided below, in Sections 6.1 to 6.6. Photographs of each site are provided in Appendix B.

6.1 STREAM MORPHOLOGY

A range of morphologies in riverine systems, creeks, drainage lines, palustrine, and lacustrine areas exist in the region. Stream morphology analysis was conducted along a range of sites encompassing creeks, drainage lines and lacustrine wetlands, with stream orders ranging between first order and fourth order as described in Section 5.3.4. A fourth order watercourse known as Retreat Creek occurs in the north of the Project site, while the second order stream Taroborah Creek occurs in the south of the site. All other watercourses within the Project site occur as ephemeral stream order 1 and 2 drainage lines. Several palustrine and lacustrine wetland areas also occur throughout the Project site.

The surveyed streams show indicators of low to moderate anthropogenic disturbances and associated impacts. First and second order streams were narrow in width and varied from relatively flat to gently sloping, and were generally stabilised by established vegetation. Each stream consisted of a sand, silt and/or clay substrate within the creek beds and fringing riparian vegetation dominated by River Red Gum (*Eucalyptus camaldulensis*) or Black Tea Tree (*Melaleuca bracteata*).

6.2 SURFACE WATER

Due to insufficient water levels, water quality sampling could not be completed at six sampling sites (i.e. TAS1, TAS2, TAS7, TAS8, TAS9 and TAS12) during the initial dry season survey and two sampling sites (i.e. AQ12 and AQ9) during the wet season survey. Additionally, in situ water readings were unable to be obtained at another wet season survey site (i.e. AQ3). During subsequent sampling events, dry season samples were able to be obtained at TAS1, TAS2, TAS7 and TAS8 on at least one occasion, while wet season samples were able to be obtained at AQ12 on two occasions. Sites TAS9 and TAS12 were unable to be sampled during any dry season sampling events.

Physio-chemical and biological water quality results at each sampling location including the Wetlands (refer to Table 8 and Table 9), the Pastoral Dams (refer to Table 13 and Table 14), Retreat Creek (refer to Table 18 and Table 19) and Taroborah Creek (refer to Table 23 and Table 25) have been compared to the Lower Nogoa / Theresa Creek WQOs, including the Freshwater Lakes / Reservoirs and Wetland components where applicable, in accordance with the *Environmental Protection (Water) Policy 2009 Nogoa River Sub-basin Environmental Values and Water Quality Objectives Basin No. 130 (part), including all waters of the Nogoa River Sub-basin* (EHP 2011), in addition to both the ANZECC (2000) Aquatic Ecosystem Guidelines for 95% species protection and the ANZECC (2000) Livestock Drinking Water Guidelines.

In addition, the results for dissolved and total heavy metal analysis for the Wetlands (refer to Table 10 and Table 11 respectively), the Pastoral Dams (refer to Table 15 and Table 16 respectively), Retreat Creek (refer to Table 20 and Table 21 respectively) and Taroborah Creek (refer to Table 25 and Table 26 respectively) have been compared to the ANZECC (2000) Aquatic Ecosystem Guidelines for 95% species protection and the ANZECC (2000) Livestock Drinking Water Guidelines.

Additionally, the results of the total metal analysis for surface waters have been compared against the Australian Drinking Water Guidelines (ADWG) (National Health and Medical Research Council (NHMRC) 2011) and the ANZECC (2000) Irrigation trigger values for the Wetlands (refer to Table 12), the Pastoral Dams (Table 17), Retreat Creek (refer to Table 22) and Taroborah Creek (refer to Table



27). Irrigation trigger values include both the long-term trigger value (LTV), which assumes irrigation will be taking place for up to 100 years and the short-term trigger value (STV), which assumes irrigation will be taking place for up to 20 years. Results of the total metal analysis are presented in 0.

Where these WQOs and guideline values have been exceeded is highlighted within each table as follows:

- Bold red numeral / white background cell – indicates an exceedance of the Lower Nogoa / Theresa Creek WQOs, the Freshwater Lakes/ Reservoirs WQOs or the Wetland WQOs, derived from ANZECC (2000) guidelines (where applicable);
- Bold red numeral / pink background cell – indicates a value exceeding the ANZECC (2000) Aquatic Ecosystem Guidelines for 95% species protection;
- Bold red numeral / blue background cell – indicates a value exceeding the ANZECC (2000) Livestock Drinking Water Guidelines;
- Bold black numeral / pink background cell – indicates an exceedance of the Australian Drinking Water Guidelines (NHMRC 2011);
- Bold green numeral / white background cell – indicates an exceedance of the LTV provided in the ANZECC (2000) Water Quality for Irrigation and General Water Use; and
- Bold blue numeral / white background cell – indicates an exceedance of the STV provided in the ANZECC (2000) Water Quality for Irrigation and General Water Use

Please note that not all water quality parameters were tested for each sampling event. However, each summary table provided below outlines the number of analyses undertaken for each quality parameter at each site.

Water quality data collected from surface water monitoring sites during the initial aquatic surveys and since their completion are provided in Appendix C.

Table 8 Wetlands – Summary of Surface Water Quality Chemical Analytical Results

Wetlands		Field pH	Field Temp (degrees Celsius)	Field Dissolved Oxygen (%)	Field Electrical Conductivity (µS/cm)	Field Turbidity (NTU)	Lab pH	Lab Turbidity (NTU)	Lab Electrical Conductivity (µS/cm)	Sulfate as SO ₄ (mg/L)	Total Recoverable Mercury (mg/L)
Wetland Water Quality Objectives ^a		6.0-8.0	n/a	90-120	90-900	2-200	6.0-8.0	2-200	90-900	n/a	n/a
ANZECC Aquatic Ecosystem Guideline		6.5-8.5	n/a	85-110	125-2200	n/a	6.5-8.5	n/a	125-2200	n/a	0.0006
ANZECC Livestock Drinking Water Guideline		n/a	n/a	n/a	n/a	1000	n/a	1000	n/a	1000	0.002
Site	Statistic										
AQ8 / TAS8	No. of Analyses	3	2	2	3	2	0	1	0	2	2
	Mean	7.46	24.45	90.00	581.67	529.17	-	165.00	-	1.00	0.0001
	Median	7.23	24.45	90.00	410.60	529.17	-	165.00	-	1.00	0.0001
	Min	6.94	17.10	51.00	224.40	150.35	-	165.00	-	1.00	0.0001
	Max	8.20	31.80	129.00	1110.00	908.00	-	165.00	-	1.00	0.0001
	80th Percentile	7.81	28.86	113.40	830.24	756.47	-	165.00	-	1.00	0.0001
	95th Percentile	8.10	31.07	125.10	1040.06	870.12	-	165.00	-	1.00	0.0001
AQ3 / TAS3	No. of Analyses	5	4	4	5	2	4	4	4	7	7
	Mean	9.14	24.40	80.15	249.82	146.03	9.22	178.50	266.25	1.57	0.0001
	Median	9.22	24.35	81.60	263.00	146.03	9.32	179.00	289.00	1.00	0.0001
	Min	8.47	17.10	67.90	175.40	115.05	8.69	167.00	158.00	1.00	0.0001
	Max	9.62	31.80	89.50	318.00	177.00	9.54	189.00	329.00	5.00	0.0001
	80th Percentile	9.35	27.48	85.12	284.40	164.61	9.50	186.00	313.40	1.00	0.0001
	95th Percentile	9.55	30.72	88.41	309.60	173.90	9.53	188.25	325.10	3.80	0.0001
AQ13 / TAS 13	No. of Analyses	2	2	2	2	1	0	1	0	2	2
	Mean	7.71	22.65	83.75	260.75	180.03	-	144.00	-	1.00	0.0001
	Median	7.71	22.65	83.75	260.75	180.03	-	144.00	-	1.00	0.0001
	Min	7.57	17.60	63.00	252.80	180.03	-	144.00	-	1.00	0.0001
	Max	7.84	27.70	104.50	268.70	180.03	-	144.00	-	1.00	0.0001
	80th Percentile	7.79	25.68	96.20	265.52	180.03	-	144.00	-	1.00	0.0001
	95th Percentile	7.83	27.20	102.43	267.91	180.03	-	144.00	-	1.00	0.0001
AQ12 / TAS12	No. of Analyses	1	0	0	1	1	1	1	1	2	2
	Mean	8.18	-	-	705.00	440.00	8.31	555.00	991.00	3.00	0.0001
	Median	8.18	-	-	705.00	440.00	8.31	555.00	991.00	1.00	0.0001
	Min	8.18	-	-	705.00	440.00	8.31	555.00	991.00	5.00	0.0001
	Max	8.18	-	-	705.00	440.00	8.31	555.00	991.00	4.20	0.0001
	80th Percentile	8.18	-	-	705.00	440.00	8.31	555.00	991.00	4.80	0.0001
	95th Percentile	8.18	-	-	705.00	440.00	8.31	555.00	991.00	3.00	0.0001

^a derived from ANZECC (2000) default trigger values for physical and chemical stressors for tropical Australia for slightly disturbed ecosystems in accordance with the Environmental Protection (Water) Policy 2009 (EHP 2011).

Table 9 Wetlands – Summary of Surface Water Quality Chemical Analytical Results (continued)

Wetlands		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NOx) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NOx) (mg/L)	Total Phosphorus as P (mg/L)
Wetland Water Quality Objectives ^a		n/a	n/a	n/a	n/a	0.01	0.35-1.2	n/a	0.01-0.05
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
AQ8 / TAS8	No. of Analyses	3	3	3	3	3	3	3	3
	Mean	0.20	0.13	0.01	0.02	0.02	4.43	4.43	0.58
	Median	0.20	0.13	0.01	0.02	0.02	1.40	1.40	0.29
	Min	0.10	0.09	0.01	0.02	0.02	1.30	1.30	0.24
	Max	0.30	0.16	0.01	0.02	0.02	10.60	10.60	1.22
	80th Percentile	0.26	0.15	0.01	0.02	0.02	6.92	6.92	0.85
	95th Percentile	0.29	0.16	0.01	0.02	0.02	9.68	9.68	1.13
AQ3 / TAS3	No. of Analyses	7	7	7	7	7	7	7	7
	Mean	0.19	0.07	0.01	0.03	0.03	1.06	1.07	0.04
	Median	0.20	0.06	0.01	0.03	0.03	1.10	1.10	0.04
	Min	0.10	0.04	0.01	0.01	0.01	0.60	0.70	0.01
	Max	0.30	0.15	0.01	0.08	0.08	1.60	1.60	0.08
	80th Percentile	0.20	0.08	0.01	0.04	0.04	1.20	1.20	0.04
	95th Percentile	0.28	0.13	0.01	0.07	0.07	1.48	1.48	0.07
AQ13 / TAS13	No. of Analyses	2	2	2	2	2	2	2	2
	Mean	0.15	0.07	0.01	0.01	0.01	1.15	1.15	0.56
	Median	0.15	0.07	0.01	0.01	0.01	1.15	1.15	0.56
	Min	0.10	0.04	0.01	0.01	0.01	1.10	1.10	0.06
	Max	0.20	0.10	0.01	0.01	0.01	1.20	1.20	1.05
	80th Percentile	0.18	0.09	0.01	0.01	0.01	1.18	1.18	0.85
	95th Percentile	0.20	0.10	0.01	0.01	0.01	1.20	1.20	1.00
AQ12 / TAS12	No. of Analyses	2	2	2	2	2	2	2	2
	Mean	0.35	0.08	0.01	0.03	0.03	1.55	1.55	0.05
	Median	0.35	0.08	0.01	0.03	0.03	1.55	1.55	0.05
	Min	0.30	0.06	0.01	0.02	0.02	1.40	1.40	0.03
	Max	0.40	0.09	0.01	0.03	0.03	1.70	1.70	0.07
	80th Percentile	0.38	0.08	0.01	0.03	0.03	1.64	1.64	0.06
	95th Percentile	0.40	0.09	0.01	0.03	0.03	1.69	1.69	0.07

^aderived from ANZECC (2000) default trigger values for physical and chemical stressors for tropical Australia for slightly disturbed ecosystems in accordance with the Environmental Protection (Water) Policy 2009 (EHP 2011).

Table 10 Wetlands – Summary of Surface Water Quality Dissolved Metals Results

Wetlands		Dissolved Metals																		
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)	
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008	
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20	
Site	Statistic																			
AQ8 / TAS8	No. of Analyses	2	2	2	1	2	1	2	2	1	2	1	2	3	3	3	2	1	3	
	Mean	0.020	0.003	0.001	0.116	0.001	0.050	0.0001	0.001	0.002	0.001	0.210	0.001	0.015	0.001	0.003	0.005	0.0001	0.005	
	Median	0.020	0.003	0.001	0.116	0.001	0.050	0.0001	0.001	0.002	0.001	0.210	0.001	0.016	0.001	0.004	0.005	0.0001	0.005	
	Min	0.010	0.002	0.001	0.116	0.001	0.050	0.0001	0.000	0.002	0.001	0.210	0.001	0.006	0.001	0.002	0.000	0.0001	0.005	
	Max	0.030	0.003	0.001	0.116	0.001	0.050	0.0001	0.001	0.002	0.001	0.210	0.001	0.022	0.002	0.004	0.010	0.0001	0.005	
	80th Percentile	0.026	0.003	0.001	0.116	0.001	0.050	0.0001	0.001	0.002	0.001	0.210	0.001	0.020	0.002	0.004	0.008	0.0001	0.005	
	95th Percentile	0.029	0.003	0.001	0.116	0.001	0.050	0.0001	0.001	0.002	0.001	0.210	0.001	0.021	0.002	0.004	0.010	0.0001	0.005	
AQ3 / TAS3	No. of Analyses	5	5	6	5	6	4	6	6	4	6	5	5	6	6	6	6	3	6	
	Mean	0.024	0.001	0.001	0.012	0.001	0.070	0.0001	0.001	0.001	0.001	0.054	0.001	0.009	0.001	0.003	0.002	0.0004	0.005	
	Median	0.020	0.001	0.001	0.012	0.001	0.070	0.0001	0.000	0.001	0.001	0.050	0.001	0.007	0.001	0.003	0.000	0.0001	0.005	
	Min	0.010	0.001	0.001	0.011	0.001	0.060	0.0001	0.000	0.001	0.001	0.050	0.001	0.004	0.001	0.002	0.000	0.0001	0.005	
	Max	0.040	0.001	0.001	0.013	0.001	0.080	0.0001	0.001	0.001	0.001	0.003	0.070	0.001	0.021	0.003	0.003	0.010	0.0010	0.005
	80th Percentile	0.040	0.001	0.001	0.012	0.001	0.074	0.0001	0.001	0.001	0.001	0.002	0.054	0.001	0.010	0.001	0.003	0.000	0.0006	0.005
	95th Percentile	0.040	0.001	0.001	0.013	0.001	0.079	0.0001	0.001	0.001	0.001	0.003	0.066	0.001	0.018	0.003	0.003	0.008	0.0009	0.005
AQ13 / TAS 13	No. of Analyses	1	1	1	0	1	0	1	1	0	1	0	1	2	2	2	1	0	2	
	Mean	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.024	0.001	0.009	0.010	-	0.005	
	Median	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.024	0.001	0.009	0.010	-	0.005	
	Min	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.006	0.001	0.006	0.010	-	0.005	
	Max	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.042	0.001	0.012	0.010	-	0.005	
	80th Percentile	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.035	0.001	0.011	0.010	-	0.005	
	95th Percentile	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.001	-	0.001	0.040	0.001	0.012	0.010	-	0.005	
AQ12 / TAS12	No. of Analyses	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2	
	Mean	0.025	0.001	0.001	0.021	0.001	0.060	0.000	0.000	0.001	0.001	0.190	0.001	0.075	0.001	0.003	0.000	0.0001	0.005	
	Median	0.025	0.001	0.001	0.021	0.001	0.060	0.0001	0.000	0.001	0.001	0.190	0.001	0.075	0.001	0.003	0.000	0.0001	0.005	
	Min	0.010	0.001	0.001	0.014	0.001	0.050	0.0001	0.000	0.001	0.001	0.060	0.001	0.013	0.001	0.003	0.000	0.0001	0.005	

Wetlands		Dissolved Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
	Max	0.040	0.001	0.001	0.028	0.001	0.070	0.0001	0.000	0.001	0.001	0.320	0.001	0.136	0.001	0.003	0.000	0.0001	0.005
	80th Percentile	0.034	0.001	0.001	0.025	0.001	0.066	0.0001	0.000	0.001	0.001	0.268	0.001	0.111	0.001	0.003	0.000	0.0001	0.005
	95th Percentile	0.039	0.001	0.001	0.027	0.001	0.069	0.0001	0.000	0.001	0.001	0.307	0.001	0.130	0.001	0.003	0.000	0.0001	0.005

Table 11 Wetlands – Summary of Surface Water Quality Total Metals Results

Wetlands		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ8 / TAS8	No. of Analyses	3	3	3	2	3	2	3	3	2	3	2	3	3	3	3	3	2	3
	Mean	1.887	0.003	0.001	0.100	0.001	0.050	0.0002	0.004	0.004	0.003	4.125	0.001	0.256	0.001	0.007	0.007	0.001	0.007
	Median	2.750	0.002	0.001	0.100	0.001	0.050	0.0002	0.003	0.004	0.003	4.125	0.001	0.065	0.001	0.005	0.010	0.001	0.007
	Min	0.030	0.001	0.001	0.054	0.001	0.050	0.0001	0.001	0.002	0.001	2.770	0.001	0.020	0.001	0.005	0.001	0.001	0.005
	Max	2.880	0.005	0.001	0.145	0.001	0.050	0.0002	0.008	0.006	0.006	5.480	0.001	0.684	0.002	0.011	0.010	0.001	0.009
	80th Percentile	2.828	0.004	0.001	0.127	0.001	0.050	0.0002	0.006	0.005	0.005	4.938	0.001	0.436	0.002	0.009	0.010	0.001	0.008
	95th Percentile	2.867	0.005	0.001	0.140	0.001	0.050	0.0002	0.008	0.006	0.006	5.345	0.001	0.622	0.002	0.010	0.010	0.001	0.009
AQ3 / TAS3	No. of Analyses	6	6	7	6	7	5	7	7	5	7	6	6	6	6	6	7	6	6
	Mean	0.943	0.002	0.001	0.017	0.001	0.076	0.0001	0.002	0.001	0.002	0.487	0.001	0.050	0.001	0.005	0.003	0.0004	0.006
	Median	0.335	0.002	0.001	0.016	0.001	0.080	0.0001	0.001	0.001	0.002	0.405	0.001	0.046	0.001	0.004	0.000	0.0001	0.005
	Min	0.130	0.001	0.001	0.012	0.001	0.050	0.0001	0.000	0.001	0.001	0.100	0.001	0.020	0.001	0.002	0.000	0.0001	0.005
	Max	3.670	0.002	0.001	0.024	0.001	0.100	0.0001	0.008	0.002	0.008	1.220	0.001	0.104	0.001	0.009	0.010	0.001	0.008
	80th Percentile	1.010	0.002	0.001	0.019	0.001	0.092	0.0001	0.003	0.001	0.002	0.580	0.001	0.062	0.001	0.006	0.008	0.001	0.006
	95th Percentile	3.005	0.002	0.001	0.023	0.001	0.098	0.0001	0.007	0.002	0.006	1.060	0.001	0.094	0.001	0.008	0.010	0.001	0.008
AQ13 / TAS13	No. of Analyses																		

Wetlands		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
	Mean	0.410	0.001	0.001	0.086	0.001	0.080	0.0002	0.001	0.001	0.003	0.370	0.001	0.062	0.001	0.008	0.010	0.001	0.008
	Median	0.410	0.001	0.001	0.086	0.001	0.080	0.0002	0.001	0.001	0.003	0.370	0.001	0.062	0.001	0.008	0.010	0.001	0.008
	Min	0.370	0.001	0.001	0.086	0.001	0.080	0.0001	0.001	0.001	0.002	0.370	0.001	0.007	0.001	0.007	0.010	0.001	0.005
	Max	0.450	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.116	0.001	0.009	0.010	0.001	0.010
	80th Percentile	0.434	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.094	0.001	0.009	0.010	0.001	0.009
	95th Percentile	0.446	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.111	0.001	0.009	0.010	0.001	0.010

Table 12 Wetlands – Summary of Surface Water Quality Total Metals Results (continued)

Wetlands		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
AQ8 / TAS8	No. of Analyses	3	3	3	2	3	2	3	3	2	3	2	3	3	3	3	3	2	3
	Mean	1.887	0.003	0.001	0.100	0.001	0.050	0.0002	0.004	0.004	0.003	4.125	0.001	0.256	0.001	0.007	0.007	0.001	0.007
	Median	2.750	0.002	0.001	0.100	0.001	0.050	0.0002	0.003	0.004	0.003	4.125	0.001	0.065	0.001	0.005	0.010	0.001	0.007
	Min	0.030	0.001	0.001	0.054	0.001	0.050	0.0001	0.001	0.002	0.001	2.770	0.001	0.020	0.001	0.005	0.001	0.001	0.005
	Max	2.880	0.005	0.001	0.145	0.001	0.050	0.0002	0.008	0.006	0.006	5.480	0.001	0.684	0.002	0.011	0.010	0.001	0.009
	80th Percentile	2.828	0.004	0.001	0.127	0.001	0.050	0.0002	0.006	0.005	0.005	4.938	0.001	0.436	0.002	0.009	0.010	0.001	0.008
	95th Percentile	2.867	0.005	0.001	0.140	0.001	0.050	0.0002	0.008	0.006	0.006	5.345	0.001	0.622	0.002	0.010	0.010	0.001	0.009
AQ3 / TAS3	No. of Analyses	6	6	7	6	7	5	7	7	5	7	6	6	6	6	6	7	6	6
	Mean	0.943	0.002	0.001	0.017	0.001	0.076	0.0001	0.002	0.001	0.002	0.487	0.001	0.050	0.001	0.005	0.003	0.0004	0.006
	Median	0.335	0.002	0.001	0.016	0.001	0.080	0.0001	0.001	0.001	0.002	0.405	0.001	0.046	0.001	0.004	0.000	0.0001	0.005
	Min	0.130	0.001	0.001	0.012	0.001	0.050	0.0001	0.000	0.001	0.001	0.100	0.001	0.020	0.001	0.002	0.000	0.0001	0.005
	Max	3.670	0.002	0.001	0.024	0.001	0.100	0.0001	0.008	0.002	0.008	1.220	0.001	0.104	0.001	0.009	0.010	0.001	0.008
	80th	1.010	0.002	0.001	0.019	0.001	0.092	0.0001	0.003	0.001	0.002	0.580	0.001	0.062	0.001	0.006	0.008	0.001	0.006

Wetlands		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
	Percentile																		
	95th Percentile	3.005	0.002	0.001	0.023	0.001	0.098	0.0001	0.007	0.002	0.006	1.060	0.001	0.094	0.001	0.008	0.010	0.001	0.008
AQ13 / TAS13	No. of Analyses	1	1	1	0	1	0	1	1	0	1	0	1	2	2	2	1	0	2
	Mean	0.410	0.001	0.001	0.086	0.001	0.080	0.0002	0.001	0.001	0.003	0.370	0.001	0.062	0.001	0.008	0.010	0.001	0.008
	Median	0.410	0.001	0.001	0.086	0.001	0.080	0.0002	0.001	0.001	0.003	0.370	0.001	0.062	0.001	0.008	0.010	0.001	0.008
	Min	0.370	0.001	0.001	0.086	0.001	0.080	0.0001	0.001	0.001	0.002	0.370	0.001	0.007	0.001	0.007	0.010	0.001	0.005
	Max	0.450	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.116	0.001	0.009	0.010	0.001	0.010
	80th Percentile	0.434	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.094	0.001	0.009	0.010	0.001	0.009
	95th Percentile	0.446	0.001	0.001	0.086	0.001	0.080	0.0003	0.001	0.001	0.004	0.370	0.001	0.111	0.001	0.009	0.010	0.001	0.010

- The use of two colours indicates an exceedance of two guideline values. (*) indicates aesthetic trigger value available only.

Table 13 Pastoral Dams - Summary of Surface Water Quality Chemical Analytical Results

Pastoral Dams		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NOx) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NOx) (mg/L)	Total Phosphorus as P (mg/L)
Nogoa River Water Quality Objectives – Freshwater Lakes/Reservoirs		n/a	<10	n/a	n/a	<0.01	<0.35	n/a	<0.01
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
AQ4 / TAS4	No. of Analyses	5	5	5	5	5	5	5	5
	Mean	0.14	0.13	0.01	0.03	0.03	1.10	1.12	0.09
	Median	0.10	0.09	0.01	0.02	0.02	1.00	1.00	0.12
	Min	0.10	0.05	0.01	0.01	0.01	0.80	0.80	0.01
	Max	0.20	0.33	0.01	0.07	0.07	1.50	1.60	0.13
	80th Percentile	0.20	0.14	0.01	0.04	0.04	1.34	1.36	0.12
	95th Percentile	0.20	0.28	0.01	0.06	0.06	1.46	1.54	0.13
AQ6 / TAS6		No. of Analyses	4	4	4	4	4	4	4

Pastoral Dams		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NOx) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NOx) (mg/L)	Total Phosphorus as P (mg/L)
Nogoa River Water Quality Objectives – Freshwater Lakes/Reservoirs		n/a	<10	n/a	n/a	<0.01	<0.35	n/a	<0.01
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
	Mean	0.20	0.18	0.01	0.06	0.06	0.95	0.98	0.17
	Median	0.20	0.06	0.01	0.04	0.04	0.90	0.95	0.18
	Min	0.20	0.05	0.01	0.01	0.01	0.50	0.50	0.06
	Max	0.20	0.55	0.01	0.15	0.15	1.50	1.50	0.26
	80th Percentile	0.20	0.26	0.01	0.08	0.08	1.38	1.38	0.25
	95th Percentile	0.20	0.48	0.01	0.13	0.13	1.47	1.47	0.26

Table 14 Pastoral Dams - Summary of Surface Water Quality Chemical Analytical Results (continued)

Pastoral Dams		Field pH	Field Temp (degrees Celsius)	Field Dissolved Oxygen (%)	Field Electrical Conductivity (µS/cm)	Field Turbidity (NTU)	Lab pH	Lab Turbidity (NTU)	Lab Electrical Conductivity (µS/cm)	Sulfate as SO4 (mg/L)	Total Recoverable Mercury (mg/L)
Nogoa River Water Quality Objectives – Freshwater Lakes/Reservoirs		6.5-8.0	n/a	90-110	<250	1-20	6.5-8.0	1-20	<250	n/a	n/a
ANZECC Aquatic Ecosystem Guideline		6.5-8.5	n/a	85-110	125-2200	n/a	6.5-8.5	n/a	125-2200	n/a	0.0006
ANZECC Livestock Drinking Water Guideline		n/a	n/a	n/a	n/a	1000	n/a	1000	n/a	1000	0.002
Site	Statistic										
AQ4 / TAS4	No. of Analyses	4	3	3	4	3	3	3	3	5	5
	Mean	8.25	26.87	78.57	856.75	548.79	7.83	480.67	1151.67	7.60	0.0001
	Median	8.30	24.90	66.00	917.50	543.00	8.11	603.00	1010.00	6.00	0.0001
	Min	8.05	21.60	65.80	211.00	141.37	7.26	170.00	995.00	1.00	0.0001
	Max	8.37	34.10	103.90	1381.00	962.00	8.13	669.00	1450.00	20.00	0.0001
	80th Percentile	8.33	30.42	88.74	1156.60	794.40	8.12	642.60	1274.00	9.60	0.0001
	95th Percentile	8.36	33.18	100.11	1324.90	920.10	8.13	662.40	1406.00	17.40	0.0001
AQ6 / TAS6	No. of Analyses	3	2	2	3	3	2	2	2	4	4
	Mean	8.07	24.10	64.55	1166.90	730.06	8.04	2349.50	3593.00	78.25	0.0001
	Median	8.15	24.10	64.55	290.80	194.84	8.04	2349.50	3593.00	55.50	0.0001
	Min	7.72	21.80	46.60	229.90	155.35	7.85	219.00	246.00	1.00	0.0001
	Max	8.34	26.40	82.50	2980.00	1840.00	8.23	4480.00	6940.00	201.00	0.0001
	80th Percentile	8.26	25.48	75.32	1904.32	1181.93	8.15	3627.80	5601.20	146.40	0.0001
	95th Percentile	8.32	26.17	80.71	2711.08	1675.48	8.21	4266.95	6605.30	187.35	0.0001

Table 15 Pastoral Dams - Summary of Surface Water Quality Dissolved Metals Results

Pastoral Dams		Dissolved Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ4 / TAS4	No. of Analyses	4	4	5	4	5	3	5	5	3	5	4	4	4	4	4	5	3	4
	Mean	0.038	0.002	0.001	0.101	0.001	0.053	0.0001	0.000	0.001	0.001	0.075	0.001	0.252	0.001	0.003	0.002	0.00040	0.005
	Median	0.030	0.002	0.001	0.105	0.001	0.050	0.0001	0.000	0.001	0.001	0.055	0.001	0.211	0.001	0.004	0.000	0.00010	0.005
	Min	0.010	0.001	0.001	0.073	0.001	0.050	0.0001	0.000	0.001	0.001	0.050	0.001	0.161	0.001	0.002	0.000	0.00010	0.005
	Max	0.080	0.002	0.001	0.120	0.001	0.060	0.0001	0.001	0.001	0.001	0.140	0.001	0.426	0.002	0.004	0.010	0.00100	0.005
	80th Percentile	0.062	0.002	0.001	0.118	0.001	0.056	0.0001	0.000	0.001	0.001	0.092	0.001	0.301	0.001	0.004	0.002	0.00064	0.005
	95th Percentile	0.076	0.002	0.001	0.120	0.001	0.059	0.0001	0.001	0.001	0.001	0.128	0.001	0.395	0.002	0.004	0.008	0.00091	0.005
AQ6 / TAS6	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	4	2	3
	Mean	0.027	0.006	0.001	0.236	0.001	0.050	0.0001	0.000	0.002	0.001	0.140	0.001	1.052	0.001	0.002	0.003	0.001	0.005
	Median	0.010	0.006	0.001	0.215	0.001	0.050	0.0001	0.000	0.002	0.001	0.130	0.001	1.080	0.001	0.002	0.000	0.001	0.005
	Min	0.010	0.002	0.001	0.084	0.001	0.050	0.0001	0.000	0.002	0.001	0.050	0.001	0.006	0.001	0.001	0.000	0.001	0.005
	Max	0.060	0.010	0.001	0.408	0.001	0.050	0.0001	0.001	0.002	0.002	0.240	0.001	2.070	0.002	0.004	0.010	0.001	0.005
	80th Percentile	0.040	0.008	0.001	0.331	0.001	0.050	0.0001	0.001	0.002	0.002	0.196	0.001	1.674	0.002	0.003	0.004	0.001	0.005
	95th Percentile	0.055	0.010	0.001	0.389	0.001	0.050	0.0001	0.001	0.002	0.002	0.229	0.001	1.971	0.002	0.004	0.009	0.001	0.005

Table 16 Pastoral Dams - Summary of Surface Water Quality Total Metal Results

Pastoral Dams		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ4 / TAS4	No. of Analyses	4	4	5	4	5	3	5	5	3	5	4	4	4	4	4	5	4	4
	Mean	0.590	0.003	0.001	0.111	0.001	0.053	0.0141	0.101	0.002	0.362	1.108	0.001	0.421	0.002	0.005	0.002	0.0003	0.005
	Median	0.405	0.002	0.001	0.110	0.001	0.050	0.0001	0.001	0.002	0.002	0.995	0.001	0.402	0.002	0.004	0.000	0.0001	0.005
	Min	0.210	0.002	0.001	0.084	0.001	0.050	0.0001	0.001	0.001	0.001	0.720	0.001	0.256	0.001	0.003	0.000	0.0001	0.005
	Max	1.340	0.004	0.001	0.141	0.001	0.060	0.0700	0.500	0.003	1.800	1.720	0.001	0.624	0.002	0.008	0.010	0.0010	0.006
	80th	0.860	0.003	0.001	0.133	0.001	0.056	0.0141	0.102	0.003	0.363	1.330	0.001	0.512	0.002	0.006	0.002	0.0004	0.005

Pastoral Dams		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
	Percentile																		
	95th Percentile	1.220	0.004	0.001	0.139	0.001	0.059	0.0560	0.400	0.003	1.441	1.623	0.001	0.596	0.002	0.007	0.008	0.00087	0.006
AQ6 / TAS6	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	4	3	3
	Mean	0.610	0.006	0.001	0.250	0.001	0.050	0.0001	0.0007	0.002	0.002	0.673	0.001	1.100	0.001	0.001	0.003	0.0004	0.007
	Median	0.060	0.006	0.001	0.207	0.001	0.050	0.0001	0.0003	0.002	0.001	0.050	0.001	1.180	0.001	0.001	0.000	0.0001	0.006
	Min	0.030	0.002	0.001	0.116	0.001	0.050	0.0001	0.0002	0.001	0.001	0.050	0.001	0.051	0.001	0.001	0.000	0.0001	0.005
	Max	1.740	0.010	0.001	0.427	0.001	0.050	0.0001	0.002	0.002	0.004	1.920	0.001	2.070	0.002	0.002	0.010	0.0010	0.009
	80th Percentile	1.068	0.008	0.001	0.339	0.001	0.050	0.0001	0.001	0.002	0.003	1.172	0.001	1.714	0.002	0.002	0.004	0.0006	0.008
	95th Percentile	1.572	0.010	0.001	0.405	0.001	0.050	0.0001	0.002	0.002	0.004	1.733	0.001	1.981	0.002	0.002	0.009	0.0009	0.009

Table 17 Pastoral Dams - Summary of Surface Water Quality Total Metal Results (continued)

Pastoral Dams		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
AQ4 / TAS4	No. of Analyses	4	4	5	4	5	3	5	5	3	5	4	4	4	4	4	5	4	4
	Mean	0.590	0.003	0.001	0.111	0.001	0.053	0.0141	0.101	0.002	0.362	1.108	0.001	0.421	0.002	0.005	0.002	0.0003	0.005
	Median	0.405	0.002	0.001	0.110	0.001	0.050	0.0001	0.001	0.002	0.002	0.995	0.001	0.402	0.002	0.004	0.000	0.0001	0.005
	Min	0.210	0.002	0.001	0.084	0.001	0.050	0.0001	0.001	0.001	0.001	0.720	0.001	0.256	0.001	0.003	0.000	0.0001	0.005
	Max	1.340	0.004	0.001	0.141	0.001	0.060	0.0700	0.500	0.003	1.800	1.720	0.001	0.624	0.002	0.008	0.010	0.0010	0.006
	80th Percentile	0.860	0.003	0.001	0.133	0.001	0.056	0.0141	0.102	0.003	0.363	1.330	0.001	0.512	0.002	0.006	0.002	0.0004	0.005
	95th Percentile	1.220	0.004	0.001	0.139	0.001	0.059	0.0560	0.400	0.003	1.441	1.623	0.001	0.596	0.002	0.007	0.008	0.00087	0.006
AQ6 / TAS6	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	4	3	3
	Mean	0.610	0.006	0.001	0.250	0.001	0.050	0.0001	0.0007	0.002	0.002	0.673	0.001	1.100	0.001	0.001	0.003	0.0004	0.007

Pastoral Dams		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
	Median	0.060	0.006	0.001	0.207	0.001	0.050	0.0001	0.0003	0.002	0.001	0.050	0.001	1.180	0.001	0.001	0.000	0.0001	0.006
	Min	0.030	0.002	0.001	0.116	0.001	0.050	0.0001	0.0002	0.001	0.001	0.050	0.001	0.051	0.001	0.001	0.000	0.0001	0.005
	Max	1.740	0.010	0.001	0.427	0.001	0.050	0.0001	0.002	0.002	0.004	1.920	0.001	2.070	0.002	0.002	0.010	0.0010	0.009
	80th Percentile	1.068	0.008	0.001	0.339	0.001	0.050	0.0001	0.001	0.002	0.003	1.172	0.001	1.714	0.002	0.002	0.004	0.0006	0.008
	95th Percentile	1.572	0.010	0.001	0.405	0.001	0.050	0.0001	0.002	0.002	0.004	1.733	0.001	1.981	0.002	0.002	0.009	0.0009	0.009

- The use of two colours indicates an exceedance of two guideline values. (*) indicates aesthetic trigger value available only

Table 18 Retreat Creek and Tributaries - Summary of Surface Water Quality Chemical Analytical Results

Retreat Creek		Field pH	Field Temp (degrees Celsius)	Field Dissolved Oxygen (%)	Field Electrical Conductivity (µS/cm)	Field Turbidity (NTU)	Lab pH	Lab Turbidity (NTU)	Lab Electrical Conductivity (µS/cm)	Sulfate as SO4 (mg/L)	Total Recoverable Mercury (mg/L)
Nogoa River Water Quality Objectives		6.5-8.5	n/a	85-110	250-340	50	6.5-8.5	50	250-340	25	n/a
ANZECC Aquatic Ecosystem Guideline		6.5-8.5	n/a	85-110	125-2200	n/a	6.5-8.5	n/a	125-2200	n/a	0.0006
ANZECC Livestock Drinking Water Guideline		n/a	n/a	n/a	n/a	1000	n/a	1000	n/a	1000	0.002
Site	Statistic										
AQ1 / TAS1	No. of Analyses	4	3	3	4	2	1	2	1	4	4
	Mean	8.01	21.33	74.73	880.15	475.13	8.14	476.00	1150.00	54.00	0.0001
	Median	7.94	21.20	68.30	951.00	475.13	8.14	476.00	1150.00	64.00	0.0001
	Min	7.78	15.50	48.90	358.60	240.26	8.14	242.00	1150.00	1.00	0.0001
	Max	8.39	27.30	107.00	1260.00	710.00	8.14	710.00	1150.00	87.00	0.0001
	80th Percentile	8.16	24.86	91.52	1207.80	616.05	8.14	616.40	1150.00	73.80	0.0001
	95th Percentile	8.33	26.69	103.13	1246.95	686.51	8.14	686.60	1150.00	83.70	0.0001
AQ2 / TAS2	No. of Analyses	5	4	4	5	2	3	4	3	6	6
	Mean	7.73	23.48	57.15	1196.58	658.06	7.91	907.25	1448.00	5.00	0.0001
	Median	7.60	23.65	51.80	1670.00	658.06	7.92	900.00	1690.00	2.50	0.0001
	Min	7.39	16.60	9.70	233.30	156.11	7.80	159.00	814.00	1.00	0.0001
	Max	8.23	30.00	115.30	1875.00	1160.00	8.00	1670.00	1840.00	17.00	0.0001
	80th Percentile	8.01	28.08	91.18	1758.20	959.22	7.97	1376.00	1780.00	6.00	0.0001
	95th Percentile	8.18	29.52	109.27	1845.80	1109.81	7.99	1596.50	1825.00	14.25	0.0001

Retreat Creek		Field pH	Field Temp (degrees Celsius)	Field Dissolved Oxygen (%)	Field Electrical Conductivity (µS/cm)	Field Turbidity (NTU)	Lab pH	Lab Turbidity (NTU)	Lab Electrical Conductivity (µS/cm)	Sulfate as SO ₄ (mg/L)	Total Recoverable Mercury (mg/L)
Nogoa River Water Quality Objectives		6.5-8.5	n/a	85-110	250-340	50	6.5-8.5	50	250-340	25	n/a
ANZECC Aquatic Ecosystem Guideline		6.5-8.5	n/a	85-110	125-2200	n/a	6.5-8.5	n/a	125-2200	n/a	0.0006
ANZECC Livestock Drinking Water Guideline		n/a	n/a	n/a	n/a	1000	n/a	1000	n/a	1000	0.002
Site	Statistic										
AQ5 / TAS5	No. of Analyses	4	3	3	4	3	2	2	2	4	4
	Mean	8.17	27.00	93.57	768.08	430.95	8.08	418.50	902.50	16.00	0.0001
	Median	8.12	26.60	78.70	857.00	468.00	8.08	418.50	902.50	17.50	0.0001
	Min	7.83	20.30	56.70	298.30	199.86	7.95	220.00	735.00	1.00	0.0001
	Max	8.61	34.10	145.30	1060.00	625.00	8.20	617.00	1070.00	28.00	0.0001
	80th Percentile	8.38	31.10	118.66	1057.00	562.20	8.15	537.60	1003.00	25.00	0.0001
	95th Percentile	8.55	33.35	138.64	1059.25	609.30	8.19	597.15	1053.25	27.25	0.0001
AQ11 / TAS11	No. of Analyses	5	4	4	5	3	4	4	4	6	6
	Mean	8.89	25.95	72.20	2302.20	1666.10	9.04	1430.00	2022.50	20.50	0.0001
	Median	8.95	27.10	56.30	2008.00	1417.00	8.98	1190.00	2050.00	20.50	0.0001
	Min	8.64	20.80	51.20	1797.00	1040.00	8.90	1040.00	1760.00	16.00	0.0001
	Max	9.08	28.80	125.00	3793.00	2541.31	9.31	2300.00	2230.00	24.00	0.0001
	80th Percentile	8.98	28.38	86.30	2385.00	2091.59	9.12	1652.00	2164.00	24.00	0.0001
	95th Percentile	9.06	28.70	115.33	3441.00	2428.88	9.26	2138.00	2213.50	24.00	0.0001

Table 19 Retreat Creek and Tributaries - Summary of Surface Water Quality Chemical Analytical Results (continued)

Retreat Creek		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NO _x) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NO _x) (mg/L)	Total Phosphorus as P (mg/L)
Nogoa River Water Quality Objectives		n/a	10	0.06	0.06	n/a	0.5	n/a	0.05
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
AQ1 / TAS1	No. of Analyses	4	4	4	4	4	4	4	4
	Mean	0.23	0.06	0.01	0.03	0.03	0.68	0.68	0.17
	Median	0.20	0.06	0.01	0.02	0.02	0.50	0.50	0.17
	Min	0.20	0.04	0.01	0.01	0.01	0.30	0.30	0.09
	Max	0.30	0.09	0.01	0.05	0.05	1.40	1.40	0.24
	80th Percentile	0.24	0.07	0.01	0.03	0.03	0.92	0.92	0.22
	95th Percentile	0.29	0.09	0.01	0.05	0.05	1.28	1.28	0.24

Retreat Creek		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NOx) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NOx) (mg/L)	Total Phosphorus as P (mg/L)
Nogoa River Water Quality Objectives		n/a	10	0.06	0.06	n/a	0.5	n/a	0.05
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
AQ2 / TAS2	No. of Analyses	6	6	6	6	6	6	6	6
	Mean	0.12	0.06	0.01	0.02	0.02	1.20	1.20	0.31
	Median	0.10	0.06	0.01	0.01	0.01	0.95	0.95	0.19
	Min	0.10	0.05	0.01	0.01	0.01	0.70	0.70	0.07
	Max	0.20	0.07	0.01	0.03	0.03	2.60	2.60	0.90
	80th Percentile	0.10	0.06	0.01	0.02	0.02	1.20	1.20	0.37
	95th Percentile	0.18	0.07	0.01	0.03	0.03	2.25	2.25	0.77
AQ5 / TAS5	No. of Analyses	4	4	4	4	4	4	4	4
	Mean	0.25	0.08	0.01	0.04	0.04	1.50	1.53	0.19
	Median	0.20	0.08	0.01	0.03	0.03	0.75	0.75	0.12
	Min	0.20	0.05	0.01	0.01	0.01	0.50	0.50	0.08
	Max	0.40	0.09	0.01	0.07	0.07	4.00	4.10	0.43
	80th Percentile	0.28	0.08	0.01	0.05	0.05	2.08	2.12	0.24
	95th Percentile	0.37	0.09	0.01	0.07	0.07	3.52	3.61	0.38
AQ11 / TAS11	No. of Analyses	6	6	6	6	6	6	6	6
	Mean	0.25	0.09	0.02	0.12	0.13	1.27	1.37	0.11
	Median	0.25	0.08	0.01	0.04	0.04	1.15	1.30	0.12
	Min	0.20	0.06	0.01	0.02	0.02	0.80	1.00	0.01
	Max	0.30	0.12	0.08	0.56	0.64	1.80	1.80	0.22
	80th Percentile	0.30	0.11	0.01	0.04	0.04	1.70	1.70	0.19
	95th Percentile	0.30	0.12	0.06	0.43	0.49	1.78	1.78	0.21

Table 20 Retreat Creek and Tributaries - Summary of Surface Water Quality Dissolved Metals Results

Retreat Creek		Dissolved Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ1 / TAS1	No. of Analyses	3	3	3	2	3	2	3	3	2	3	2	3	4	4	4	3	0	4
	Mean	0.017	0.002	0.001	0.080	0.001	0.050	0.0001	0.000	0.001	0.001	0.050	0.001	0.034	0.001	0.001	0.003	-	0.009
	Median	0.010	0.001	0.001	0.080	0.001	0.050	0.0001	0.000	0.001	0.001	0.050	0.001	0.015	0.001	0.001	0.000	-	0.007
	Min	0.010	0.001	0.001	0.061	0.001	0.050	0.0001	0.000	0.001	0.001	0.050	0.001	0.009	0.001	0.001	0.000	-	0.005
	Max	0.030	0.004	0.001	0.099	0.001	0.050	0.0001	0.001	0.001	0.001	0.050	0.001	0.098	0.001	0.001	0.010	-	0.018
	80th Percentile	0.022	0.003	0.001	0.091	0.001	0.050	0.0001	0.001	0.001	0.001	0.050	0.001	0.050	0.001	0.001	0.006	-	0.012
	95th Percentile	0.028	0.004	0.001	0.097	0.001	0.050	0.0001	0.001	0.001	0.001	0.050	0.001	0.086	0.001	0.001	0.009	-	0.017
AQ2 / TAS2	No. of Analyses	5	5	5	4	5	4	5	5	4	5	4	5	6	6	6	5	2	6
	Mean	0.028	0.003	0.001	0.141	0.001	0.053	0.0001	0.0005	0.001	0.001	0.123	0.001	0.443	0.001	0.002	0.002	0.00010	0.006
	Median	0.010	0.004	0.001	0.147	0.001	0.050	0.0001	0.0002	0.001	0.001	0.075	0.001	0.358	0.001	0.002	0.000	0.00010	0.005
	Min	0.010	0.001	0.001	0.102	0.001	0.050	0.0001	0.0002	0.001	0.001	0.060	0.001	0.014	0.001	0.001	0.000	0.00010	0.005
	Max	0.100	0.005	0.001	0.167	0.001	0.060	0.0001	0.0010	0.002	0.001	0.280	0.001	0.953	0.001	0.004	0.010	0.00010	0.010
	80th Percentile	0.028	0.004	0.001	0.160	0.001	0.054	0.0001	0.0008	0.001	0.001	0.166	0.001	0.919	0.001	0.002	0.002	0.00010	0.007
	95th Percentile	0.082	0.005	0.001	0.165	0.001	0.059	0.0001	0.0009	0.002	0.001	0.252	0.001	0.945	0.001	0.004	0.008	0.00010	0.009
AQ5 / TAS5	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	3	3	3
	Mean	0.033	0.004	0.001	0.117	0.001	0.060	0.0001	0.000	0.002	0.002	0.090	0.001	1.256	0.003	0.003	0.003	0.0004	0.005
	Median	0.020	0.004	0.001	0.125	0.001	0.060	0.0001	0.000	0.002	0.002	0.050	0.001	1.310	0.001	0.002	0.000	0.0001	0.005
	Min	0.010	0.001	0.001	0.055	0.001	0.050	0.0001	0.000	0.002	0.001	0.050	0.001	0.007	0.001	0.001	0.000	0.0001	0.005
	Max	0.070	0.008	0.001	0.170	0.001	0.070	0.0001	0.001	0.002	0.003	0.170	0.001	2.450	0.006	0.005	0.010	0.0010	0.005
	80th Percentile	0.050	0.006	0.001	0.152	0.001	0.066	0.0001	0.001	0.002	0.002	0.122	0.001	1.994	0.004	0.004	0.004	0.0006	0.005
	95th Percentile	0.065	0.008	0.001	0.166	0.001	0.069	0.0001	0.001	0.002	0.002	0.158	0.001	2.336	0.006	0.005	0.009	0.0009	0.005
AQ11 / TAS11	No. of Analyses	5	5	6	5	6	4	6	6	4	6	5	5	5	5	5	6	3	5
	Mean	0.012	0.002	0.001	0.081	0.001	0.340	0.0001	0.001	0.001	0.001	0.050	0.001	0.010	0.001	0.004	0.002	0.0004	0.007
	Median	0.010	0.002	0.001	0.076	0.001	0.340	0.0001	0.001	0.001	0.001	0.050	0.001	0.004	0.001	0.004	0.000	0.0001	0.005
	Min	0.010	0.001	0.001	0.046	0.001	0.320	0.0001	0.000	0.001	0.001	0.050	0.001	0.002	0.001	0.003	0.000	0.0001	0.005

Retreat Creek		Dissolved Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
	Max	0.020	0.003	0.002	0.114	0.001	0.360	0.0001	0.001	0.001	0.007	0.050	0.001	0.025	0.002	0.005	0.010	0.0010	0.013
	80th Percentile	0.012	0.002	0.001	0.101	0.001	0.354	0.0001	0.001	0.001	0.003	0.050	0.001	0.019	0.001	0.005	0.001	0.0006	0.007
	95th Percentile	0.018	0.003	0.002	0.111	0.001	0.359	0.0001	0.001	0.001	0.001	0.006	0.050	0.001	0.023	0.002	0.005	0.008	0.0009

Table 21 Retreat Creek - Summary of Surface Water Quality Total Metals Results

Retreat Creek		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ1 / TAS1	No. of Analyses	4	4	4	3	4	3	4	4	3	4	3	4	4	4	4	4	3	4
	Mean	0.570	0.003	0.001	0.093	0.001	0.050	0.0001	0.001	0.001	0.002	0.667	0.001	0.120	0.001	0.002	0.005	0.0004	0.005
	Median	0.540	0.002	0.001	0.096	0.001	0.050	0.0001	0.001	0.001	0.002	0.620	0.001	0.075	0.001	0.002	0.005	0.0001	0.005
	Min	0.480	0.002	0.001	0.078	0.001	0.050	0.0001	0.001	0.001	0.001	0.610	0.001	0.044	0.001	0.001	0.000	0.0001	0.005
	Max	0.720	0.004	0.001	0.105	0.001	0.050	0.0001	0.001	0.001	0.002	0.770	0.001	0.285	0.002	0.002	0.010	0.0010	0.005
	80th Percentile	0.636	0.003	0.001	0.101	0.001	0.050	0.0001	0.001	0.001	0.002	0.710	0.001	0.174	0.001	0.002	0.010	0.0006	0.005
	95th Percentile	0.699	0.004	0.001	0.104	0.001	0.050	0.0001	0.001	0.001	0.002	0.755	0.001	0.257	0.002	0.002	0.010	0.0009	0.005
AQ2 / TAS2	No. of Analyses	5	6	6	5	6	5	6	6	5	6	5	6	6	6	6	6	5	6
	Mean	0.347	0.004	0.001	0.141	0.001	0.054	0.0001	0.002	0.001	0.001	1.412	0.001	0.832	0.001	0.003	0.003	0.0003	0.007
	Median	0.200	0.004	0.001	0.131	0.001	0.050	0.0001	0.001	0.001	0.001	0.880	0.001	0.856	0.001	0.003	0.000	0.0001	0.006
	Min	0.040	0.001	0.001	0.092	0.001	0.050	0.0001	0.000	0.001	0.001	0.210	0.001	0.105	0.001	0.002	0.000	0.0001	0.005
	Max	1.210	0.006	0.001	0.204	0.001	0.070	0.0002	0.006	0.002	0.004	3.990	0.003	1.380	0.001	0.006	0.010	0.0010	0.014
	80th Percentile	0.340	0.006	0.001	0.183	0.001	0.054	0.0001	0.002	0.002	0.002	1.902	0.001	1.150	0.001	0.004	0.010	0.0003	0.009
	95th Percentile	0.993	0.006	0.001	0.199	0.001	0.066	0.0002	0.005	0.002	0.004	3.468	0.003	1.323	0.001	0.006	0.010	0.0008	0.013

Retreat Creek		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	0.013	n/a	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	0.5	n/a	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ5 / TAS5	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	4	3	3
	Mean	1.460	0.007	0.001	0.155	0.001	0.060	0.0001	0.001	0.004	0.002	1.803	0.002	2.039	0.003	0.004	0.003	0.0004	0.009
	Median	1.700	0.004	0.001	0.119	0.001	0.060	0.0001	0.001	0.004	0.002	0.720	0.001	2.190	0.001	0.002	0.000	0.0001	0.011
	Min	0.100	0.002	0.001	0.088	0.001	0.050	0.0001	0.000	0.001	0.001	0.380	0.001	0.066	0.001	0.001	0.000	0.0001	0.005
	Max	2.580	0.014	0.001	0.258	0.001	0.070	0.0001	0.003	0.006	0.005	4.310	0.004	3.860	0.006	0.009	0.010	0.0010	0.012
	80th Percentile	2.228	0.010	0.001	0.202	0.001	0.066	0.0001	0.002	0.005	0.003	2.874	0.003	3.192	0.004	0.006	0.004	0.0006	0.012
	95th Percentile	2.492	0.013	0.001	0.244	0.001	0.069	0.0001	0.003	0.006	0.004	3.951	0.004	3.693	0.006	0.008	0.009	0.0009	0.012
AQ11 / TAS11	No. of Analyses	5	5	6	5	6	4	6	6	4	6	5	5	5	5	5	6	5	5
	Mean	1.710	0.002	0.001	0.088	0.001	0.340	0.0001	0.003	0.003	0.004	1.918	0.001	0.054	0.001	0.008	0.002	0.0003	0.009
	Median	1.650	0.002	0.001	0.098	0.001	0.345	0.0001	0.002	0.002	0.004	1.340	0.001	0.042	0.001	0.007	0.000	0.0001	0.007
	Min	0.120	0.001	0.001	0.048	0.001	0.270	0.0001	0.001	0.002	0.002	0.760	0.001	0.024	0.001	0.004	0.000	0.0001	0.005
	Max	4.310	0.003	0.001	0.113	0.001	0.400	0.0001	0.008	0.004	0.007	4.580	0.001	0.106	0.002	0.013	0.010	0.0010	0.019
	80th Percentile	2.214	0.002	0.001	0.111	0.001	0.382	0.0001	0.004	0.003	0.005	2.292	0.001	0.068	0.002	0.010	0.001	0.0003	0.010
	95th Percentile	3.786	0.003	0.001	0.113	0.001	0.396	0.0001	0.007	0.004	0.007	4.008	0.001	0.097	0.002	0.012	0.008	0.0008	0.017

Table 22 Retreat Creek - Summary of Surface Water Quality Total Metals Results (continued)

Retreat Creek		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
AQ1 / TAS1	No. of Analyses	4	4	4	3	4	3	4	4	3	4	3	4	4	4	4	4	3	4
	Mean	0.570	0.003	0.001	0.093	0.001	0.050	0.0001	0.001	0.001	0.002	0.667	0.001	0.120	0.001	0.002	0.005	0.0004	0.005
	Median	0.540	0.002	0.001	0.096	0.001	0.050	0.0001	0.001	0.001	0.002	0.620	0.001	0.075	0.001	0.002	0.005	0.0001	0.005
	Min	0.480	0.002	0.001	0.078	0.001	0.050	0.0001	0.001	0.001	0.001	0.610	0.001	0.044	0.001	0.001	0.000	0.0001	0.005

Retreat Creek		Total Metals																	
		Al (mg/L)	As (mg/L)	Sb (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
	Max	0.720	0.004	0.001	0.105	0.001	0.050	0.0001	0.001	0.001	0.002	0.770	0.001	0.285	0.002	0.002	0.010	0.0010	0.005
	80th Percentile	0.636	0.003	0.001	0.101	0.001	0.050	0.0001	0.001	0.001	0.002	0.710	0.001	0.174	0.001	0.002	0.010	0.0006	0.005
	95th Percentile	0.699	0.004	0.001	0.104	0.001	0.050	0.0001	0.001	0.001	0.002	0.755	0.001	0.257	0.002	0.002	0.010	0.0009	0.005
AQ2 / TAS2	No. of Analyses	5	6	6	5	6	5	6	6	5	6	5	6	6	6	6	6	5	6
	Mean	0.347	0.004	0.001	0.141	0.001	0.054	0.0001	0.002	0.001	0.001	1.412	0.001	0.832	0.001	0.003	0.003	0.0003	0.007
	Median	0.200	0.004	0.001	0.131	0.001	0.050	0.0001	0.001	0.001	0.001	0.880	0.001	0.856	0.001	0.003	0.000	0.0001	0.006
	Min	0.040	0.001	0.001	0.092	0.001	0.050	0.0001	0.000	0.001	0.001	0.210	0.001	0.105	0.001	0.002	0.000	0.0001	0.005
	Max	1.210	0.006	0.001	0.204	0.001	0.070	0.0002	0.006	0.002	0.004	3.990	0.003	1.380	0.001	0.006	0.010	0.0010	0.014
	80th Percentile	0.340	0.006	0.001	0.183	0.001	0.054	0.0001	0.002	0.002	0.002	1.902	0.001	1.150	0.001	0.004	0.010	0.0003	0.009
	95th Percentile	0.993	0.006	0.001	0.199	0.001	0.066	0.0002	0.005	0.002	0.004	3.468	0.003	1.323	0.001	0.006	0.010	0.0008	0.013
AQ5 / TAS5	No. of Analyses	3	3	4	3	4	2	4	4	2	4	3	3	3	3	3	4	3	3
	Mean	1.460	0.007	0.001	0.155	0.001	0.060	0.0001	0.001	0.004	0.002	1.803	0.002	2.039	0.003	0.004	0.003	0.0004	0.009
	Median	1.700	0.004	0.001	0.119	0.001	0.060	0.0001	0.001	0.004	0.002	0.720	0.001	2.190	0.001	0.002	0.000	0.0001	0.011
	Min	0.100	0.002	0.001	0.088	0.001	0.050	0.0001	0.000	0.001	0.001	0.380	0.001	0.066	0.001	0.001	0.000	0.0001	0.005
	Max	2.580	0.014	0.001	0.258	0.001	0.070	0.0001	0.003	0.006	0.005	4.310	0.004	3.860	0.006	0.009	0.010	0.0010	0.012
	80th Percentile	2.228	0.010	0.001	0.202	0.001	0.066	0.0001	0.002	0.005	0.003	2.874	0.003	3.192	0.004	0.006	0.004	0.0006	0.012
	95th Percentile	2.492	0.013	0.001	0.244	0.001	0.069	0.0001	0.003	0.006	0.004	3.951	0.004	3.693	0.006	0.008	0.009	0.0009	0.012
AQ11 / TAS11	No. of Analyses	5	5	6	5	6	4	6	6	4	6	5	5	5	5	5	6	5	5
	Mean	1.710	0.002	0.001	0.088	0.001	0.340	0.0001	0.003	0.003	0.004	1.918	0.001	0.054	0.001	0.008	0.002	0.0003	0.009
	Median	1.650	0.002	0.001	0.098	0.001	0.345	0.0001	0.002	0.002	0.004	1.340	0.001	0.042	0.001	0.007	0.000	0.0001	0.007
	Min	0.120	0.001	0.001	0.048	0.001	0.270	0.0001	0.001	0.002	0.002	0.760	0.001	0.024	0.001	0.004	0.000	0.0001	0.005
	Max	4.310	0.003	0.001	0.113	0.001	0.400	0.0001	0.008	0.004	0.007	4.580	0.001	0.106	0.002	0.013	0.010	0.0010	0.019
	80th Percentile	2.214	0.002	0.001	0.111	0.001	0.382	0.0001	0.004	0.003	0.005	2.292	0.001	0.068	0.002	0.010	0.001	0.0003	0.010
	95th Percentile	3.786	0.003	0.001	0.113	0.001	0.396	0.0001	0.007	0.004	0.007	4.008	0.001	0.097	0.002	0.012	0.008	0.0008	0.017

- The use of two colours indicates an exceedance of two guideline values. (*) indicates aesthetic trigger value available only

Table 23 Taroborah Creek and Tributaries - Summary of Surface Water Quality Chemical Analytical Results

Taroborah Creek		Field pH	Field Temp (degrees Celsius)	Field Dissolved Oxygen (%)	Field Electrical Conductivity (µS/cm)	Field Turbidity (NTU)	Lab pH	Lab Turbidity (NTU)	Lab Electrical Conductivity (µS/cm)	Sulfate as SO ₄ (mg/L)	Total Recoverable Mercury (mg/L)
Nogoa River Water Quality Objectives		6.5-8.5	n/a	85-110	250-340	50	6.5-8.5	50	250-340	25	n/a
ANZECC Aquatic Ecosystem Values		6.5-8.5	n/a	85-110	125-2200	n/a	6.5-8.5	n/a	125-2200	n/a	0.0006
ANZECC Livestock Drinking Water Values		n/a	n/a	n/a	n/a	1000	n/a	1000	n/a	1000	0.002
Site	Statistic										
AQ7 / TAS7	No. of Analyses	2	2	2	2	1	0	1	0	2	2
	Mean	8.66	22.05	67.40	988.50	491.11	-	432.00	-	1.00	0.0001
	Median	8.66	22.05	67.40	988.50	491.11	-	432.00	-	1.00	0.0001
	Min	8.19	13.20	9.60	733.00	491.11	-	432.00	-	1.00	0.0001
	Max	9.13	30.90	125.20	1244.00	491.11	-	432.00	-	1.00	0.0001
	80th Percentile	8.94	27.36	102.08	1141.80	491.11	-	432.00	-	1.00	0.0001
	95th Percentile	9.08	30.02	119.42	1218.45	491.11	-	432.00	-	1.00	0.0001
AQ10 / TAS10	No. of Analyses	6	5	5	6	3	4	4	4	7	7
	Mean	8.89	24.56	140.16	2285.00	1787.53	8.85	918.50	2168.50	30.14	0.0001
	Median	8.97	23.90	111.30	1982.50	1980.00	8.99	895.50	1870.00	23.00	0.0001
	Min	8.23	16.80	70.00	877.00	587.59	8.21	513.00	664.00	1.00	0.0001
	Max	9.29	32.10	221.60	4206.00	2795.00	9.20	1370.00	4270.00	82.00	0.0001
	80th Percentile	9.17	27.70	210.08	3090.00	2469.00	9.12	1274.00	2884.00	48.20	0.0001
	95th Percentile	9.26	31.00	218.72	3927.00	2713.50	9.18	1346.00	3923.50	73.30	0.0001

Table 24 Taroborah Creek - Summary of Surface Water Quality Chemical Analytical Results (continued)

Taroborah Creek		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NO _x) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NO _x) (mg/L)	Total Phosphorus as P (mg/L)
Nogoa River Water Quality Objectives		n/a	10	0.06	0.06	n/a	0.5	n/a	0.05
ANZECC Aquatic Ecosystem Values		n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.5
ANZECC Livestock Drinking Water Values		2	n/a	30	400	n/a	n/a	n/a	n/a
Site	Statistic								
AQ7 / TAS7	No. of Analyses	2	2	2	2	2	2	2	2
	Mean	0.30	0.06	0.18	1.71	1.88	0.70	2.55	0.10
	Median	0.30	0.06	0.18	1.71	1.88	0.70	2.55	0.10
	Min	0.30	0.05	0.01	0.01	0.01	0.60	0.60	0.09
	Max	0.30	0.07	0.34	3.40	3.74	0.80	4.50	0.11
	80th Percentile	0.30	0.07	0.27	2.72	2.99	0.76	3.72	0.11
	95th Percentile	0.30	0.07	0.32	3.23	3.55	0.79	4.31	0.11

Taraborah Creek		Fluoride (mg/L)	Ammonia as N (µg/L)	Nitrite as N (mg/L)	Nitrate as N (mg/L)	Nitrite plus Nitrate as N (NOx) (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Total Nitrogen as N (TKN + NOx) (mg/L)	Total Phosphorus as P (mg/L)
AQ10 / TAS10	No. of Analyses	7	7	7	7	7	7	7	7
	Mean	0.49	0.07	0.07	0.35	0.41	4.07	4.47	0.75
	Median	0.50	0.08	0.01	0.02	0.02	2.00	3.00	0.10
	Min	0.30	0.02	0.01	0.01	0.01	0.60	0.60	0.02
	Max	0.60	0.13	0.44	2.33	2.77	13.80	13.80	3.28
	80th Percentile	0.58	0.10	0.01	0.03	0.03	6.04	6.22	0.93
	95th Percentile	0.60	0.12	0.31	1.64	1.95	11.70	11.70	2.59

Table 25 Taraborah Creek and Tributaries - Summary of Surface Water Quality Dissolved Metals Results

Taraborah Creek		Dissolved Metals																	
		Al (mg/L)	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	n/a	0.013	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	n/a	0.5	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ7 / TAS7	No. of Analyses	1	1	1	0	1	0	1	1	0	1	0	1	2	2	2	1	0	2
	Mean	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.003	0.001	0.002	0.010	-	0.005
	Median	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.003	0.001	0.002	0.010	-	0.005
	Min	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.002	0.001	0.001	0.010	-	0.005
	Max	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.004	0.001	0.002	0.010	-	0.005
	80th Percentile	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.004	0.001	0.002	0.010	-	0.005
	95th Percentile	0.010	0.001	0.001	-	0.001	-	0.0001	0.001	-	0.002	-	0.001	0.004	0.001	0.002	0.010	-	0.005
AQ10 / TAS10	No. of Analyses	5	6	5	5	6	4	6	6	4	6	5	5	6	6	6	5	3	6
	Mean	0.022	0.001	0.003	0.092	0.001	0.288	0.0001	0.001	0.006	0.005	0.132	0.001	0.018	0.004	0.011	0.002	0.0004	0.005
	Median	0.010	0.001	0.002	0.086	0.001	0.310	0.0001	0.000	0.005	0.005	0.060	0.001	0.008	0.002	0.008	0.000	0.0001	0.005
	Min	0.010	0.001	0.001	0.041	0.001	0.150	0.0001	0.000	0.002	0.002	0.050	0.001	0.005	0.001	0.002	0.000	0.0001	0.005
	Max	0.050	0.001	0.006	0.162	0.001	0.380	0.0001	0.001	0.010	0.007	0.300	0.001	0.047	0.008	0.030	0.010	0.0010	0.005
	80th Percentile	0.034	0.001	0.004	0.104	0.001	0.350	0.0001	0.001	0.008	0.007	0.220	0.001	0.032	0.007	0.017	0.001	0.0006	0.005
	95th Percentile	0.046	0.001	0.006	0.147	0.001	0.373	0.0001	0.001	0.010	0.007	0.280	0.001	0.043	0.008	0.027	0.008	0.0009	0.005

Table 26 Taroborah Creek and Tributaries - Summary of Surface Water Quality Total Metals Results

Taroborah Creek		Total Metals																	
		Al (mg/L)	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
ANZECC Aquatic Ecosystem Values		0.055	n/a	0.013	n/a	n/a	0.37	0.002	0.001	n/a	0.0014	n/a	0.0034	1.9	n/a	0.011	0.011	0.00005	0.008
ANZECC Livestock Drinking Water Values		5	n/a	0.5	n/a	n/a	5	0.01	1	1	1	n/a	1	n/a	0.15	1	0.02	n/a	20
Site	Statistic																		
AQ7 / TAS7	No. of Analyses	2	2	2	1	2	1	2	2	1	2	1	2	2	2	2	2	1	2
	Mean	1.090	0.001	0.001	0.177	0.001	0.090	0.002	0.0004	0.003	0.004	2.070	0.002	0.035	0.001	0.003	0.010	0.001	0.007
	Median	1.090	0.001	0.001	0.177	0.001	0.090	0.000	0.0001	0.003	0.004	2.070	0.002	0.035	0.001	0.003	0.010	0.001	0.007
	Min	0.180	0.001	0.001	0.177	0.001	0.090	0.000	0.0001	0.003	0.002	2.070	0.001	0.006	0.001	0.001	0.010	0.001	0.005
	Max	2.000	0.001	0.001	0.177	0.001	0.090	0.010	0.0010	0.003	0.005	2.070	0.002	0.064	0.001	0.004	0.010	0.001	0.009
	80th Percentile	1.636	0.001	0.001	0.177	0.001	0.090	0.001	0.0006	0.003	0.004	2.070	0.002	0.052	0.001	0.003	0.010	0.001	0.008
	95th Percentile	1.909	0.001	0.001	0.177	0.001	0.090	0.008	0.0009	0.003	0.005	2.070	0.002	0.061	0.001	0.004	0.010	0.001	0.009
AQ10 / TAS10	No. of Analyses	6	7	6	6	7	5	7	7	5	7	6	6	6	6	6	7	6	6
	Mean	1.953	0.001	0.003	0.108	0.001	0.254	0.0001	0.003	0.007	0.006	1.967	0.001	0.084	0.004	0.016	0.003	0.0004	0.014
	Median	0.445	0.001	0.002	0.110	0.001	0.280	0.0001	0.001	0.009	0.003	0.760	0.001	0.051	0.002	0.012	0.001	0.0001	0.007
	Min	0.070	0.001	0.001	0.079	0.001	0.160	0.0001	0.001	0.001	0.003	0.250	0.001	0.021	0.001	0.002	0.000	0.0001	0.005
	Max	9.120	0.001	0.006	0.144	0.001	0.350	0.0002	0.014	0.015	0.012	8.090	0.001	0.186	0.010	0.042	0.010	0.0010	0.039
	80th Percentile	1.300	0.001	0.004	0.120	0.001	0.326	0.0001	0.002	0.011	0.008	1.560	0.001	0.172	0.008	0.025	0.008	0.0010	0.018
	95th Percentile	7.165	0.001	0.006	0.138	0.001	0.344	0.0002	0.010	0.014	0.011	6.458	0.001	0.183	0.010	0.038	0.010	0.0010	0.034

Table 27 Taroborah Creek and Tributaries - Summary of Surface Water Quality Total Metals Results (continued)

Taroborah Creek		Total Metals																	
		Al (mg/L)	Sb (mg/L)	As (mg/L)	Ba (mg/L)	Be (mg/L)	B (mg/L)	Cd (mg/L)	Cr (mg/L)	Co (mg/L)	Cu (mg/L)	Fe (mg/L)	Pb (mg/L)	Mn (mg/L)	Mo (mg/L)	Ni (mg/L)	Se (mg/L)	Ag (mg/L)	Zn (mg/L)
Australian Drinking Water Guidelines		0.2*	0.01	0.003	2	0.06	4	0.002	0.05	n/a	2	0.3*	0.01	0.5	0.05	0.02	0.01	0.1	3*
LTV Irrigation		5	0.1	n/a	n/a	0.1	0.5	0.01	0.1	0.05	0.2	0.2	2	0.2	0.01	0.2	0.02	n/a	2
STV Irrigation		20	0.1	n/a	n/a	2.0	-	0.05	1	0.1	5	10	5	10	0.05	2	0.05	n/a	5
Site	Statistic																		
AQ7 / TAS7	No. of Analyses	2	2	2	1	2	1	2	2	1	2	1	2	2	2	2	2	1	2
	Mean	1.090	0.001	0.001	0.177	0.001	0.090	0.002	0.0004	0.003	0.004	2.070	0.002	0.035	0.001	0.003	0.010	0.001	0.007
	Median	1.090	0.001	0.001	0.177	0.001	0.090	0.000	0.0001	0.003	0.004	2.070	0.002	0.035	0.001	0.003	0.010	0.001	0.007
	Min	0.180	0.001	0.001	0.177	0.001	0.090	0.000	0.0001	0.003	0.002	2.070	0.001	0.006	0.001	0.001	0.010	0.001	0.005
	Max	2.000	0.001	0.001	0.177	0.001	0.090	0.010	0.0010	0.003	0.005	2.070	0.002	0.064	0.001	0.004	0.010	0.001	0.009
	80th Percentile	1.636	0.001	0.001	0.177	0.001	0.090	0.001	0.0006	0.003	0.004	2.070	0.002	0.052	0.001	0.003	0.010	0.001	0.008
	95th Percentile	1.909	0.001	0.001	0.177	0.001	0.090	0.008	0.0009	0.003	0.005	2.070	0.002	0.061	0.001	0.004	0.010	0.001	0.009

AQ10 / TAS10	No. of Analyses	6	7	6	6	7	5	7	7	5	7	6	6	6	6	6	7	6	6
	Mean	1.953	0.001	0.003	0.108	0.001	0.254	0.0001	0.003	0.007	0.006	1.967	0.001	0.084	0.004	0.016	0.003	0.0004	0.014
	Median	0.445	0.001	0.002	0.110	0.001	0.280	0.0001	0.001	0.009	0.003	0.760	0.001	0.051	0.002	0.012	0.001	0.0001	0.007
	Min	0.070	0.001	0.001	0.079	0.001	0.160	0.0001	0.001	0.001	0.003	0.250	0.001	0.021	0.001	0.002	0.000	0.0001	0.005
	Max	9.120	0.001	0.006	0.144	0.001	0.350	0.0002	0.014	0.015	0.012	8.090	0.001	0.186	0.010	0.042	0.010	0.0010	0.039
	80th Percentile	1.300	0.001	0.004	0.120	0.001	0.326	0.0001	0.002	0.011	0.008	1.560	0.001	0.172	0.008	0.025	0.008	0.0010	0.018
	95th Percentile	7.165	0.001	0.006	0.138	0.001	0.344	0.0002	0.010	0.014	0.011	6.458	0.001	0.183	0.010	0.038	0.010	0.0010	0.034

- The use of two colours indicates an exceedance of two guideline values. (*) indicates aesthetic trigger value available only.

Wetlands – Physio- chemical Analysis Results

The physio-chemical and biological monitoring results for several wetlands represented by sites AQ/TAS3, AQ/TAS8, AQ/TAS12 and AQ/TAS13, indicate that water exceeds the trigger values for physical and chemical stressors for tropical Australia provided in ANZECC (2000), in accordance with the Wetland WQOs (EHP 2011), and the specified guidelines for Aquatic Ecosystems (ANZECC 2000) for pH, DO, EC, TDS, oxides of Nitrogen, total Nitrogen and total Phosphorus (refer to Table 8 and Table 9).

Livestock Drinking Water Guidelines were not exceeded at any wetland sites.

The pH of water determines the solubility and biological availability of chemical constituents such as nutrients (phosphorus, nitrogen, and carbon) and heavy metals (lead, copper, cadmium, etc.). The pH also determines whether aquatic life can use it. In the case of heavy metals, the degree to which they are soluble determines their toxicity. Metals tend to be more toxic at lower pH because they are more soluble.

Results indicate water bodies associated with sampling sites AQ/TAS3, AQ/TAS8, AQ/TAS12 and AQ/TAS13 are basic in nature with an average pH between these sites of 8.1, only marginally above the Wetland WQO (6.00-8.0) with a maximum pH 9.62 recorded at site AQ/TAS3.

DO levels were generally recorded outside both the ANZECC (2000) Aquatic Ecosystems Guideline (85-110%) and the Wetland WQO (90-120%). Among sites, AQ/TAS8 recorded a maximum DO gas pressure of 129%. AQ/TAS3 and AQ/TAS13 averaged 80% and 84% respectively.

Total dissolved gas pressures exceeding 115% over a period of a few hours can cause the death of any fish exposed to these conditions (Boulton and Brock 1999). This condition is termed 'gas bubble disease' and is caused by the formation of bubbles in the tissues, which eventually accumulate in the gill capillaries, killing the fish (Boulton and Brock 1999). However, DO can change considerably over a daily or diurnal period (ANZECC 2000).

Electrical Conductivity is one way to measure the inorganic materials including calcium, bicarbonate, nitrogen, phosphorus, iron, sulphur and other ions dissolved in a water body. Salinity is the component of conductivity that is critical to the survival of some aquatic plants and animals. Many species can survive only within certain salinity ranges so changes in salinity levels can result in changes to the variety and types of species found. The Wetland WQO for EC is between 90-900 $\mu\text{S}/\text{cm}$. All sites were within the Wetland WQO for EC with the exception of site AQ/TAS8, which recorded a maximum of 1110 $\mu\text{S}/\text{cm}$, but had a mean value of 582 $\mu\text{S}/\text{cm}$. All sites were within the ANZECC (2000) Aquatic Ecosystem Guideline for EC.

Nitrogen and phosphorus are two essential nutrients that are found in fresh and marine waters and are considered essential to support biological life. Eutrophication of a water body may occur during an increase of nutrient supply which can in turn lead to an abundance of algae (including toxic algal blooms) and aquatic plants. Total Nitrogen at wetland sites AQ/TAS8 and AQ/TAS12 exceeded the Wetlands WQO for total Nitrogen (0.35-1.2 mg/L). Site AQ/TAS8 recorded the highest maximum concentration of total Nitrogen of 10.6 mg/L and an average of 4.43 mg/L. The average concentration of total Nitrogen at site AQ/TAS12 was 1.55 mg/L. In addition, results indicate that total Phosphorus exceeds the Wetland WQO (0.01-0.05 mg/L) and the ANZECC (2000) Aquatic Ecosystem Guideline value of 0.5 mg/L at site AQ/TAS8 and AQ/TAS 13, maximums of 1.22 mg/L and 1.05 mg/L recorded respectively. Site AQ/TAS12 also exceeds the Wetland WQO for total Phosphorus with a maximum of 0.07 mg/L recorded.

Wetlands – Dissolved Heavy Metals

According to ANZECC (2000), the major toxic effect of metals comes from the dissolved fraction and comparison of total heavy metal concentrations are likely to overestimate the fraction that is bioavailable in the environment. Therefore, throughout this section we discuss the filtered (dissolved) results of heavy metal concentrations and the comparisons made against the applicable trigger values. However, the results of the total metal analysis for surface waters which were compared against the ADWG in addition to the ANZECC (2000) Irrigation trigger values are discussed.

Heavy metal analysis results for the wetlands indicate that water exceeds the ANZECC (2000) Aquatic Ecosystem Guidelines for Cu and Ag (refer to Table 10).

Copper

Copper (Cu) was found to exceed the ANZECC (2000) Aquatic Ecosystem Guidelines at site AQ/TAS 3. The recorded maximum of Cu was 0.003 mg/L, over twice the Aquatic Ecosystem trigger value of 0.0014 mg/L.

The observed Cu concentrations in surface waters are considered to be naturally elevated and may be due to windblown dust, decaying vegetation and forest fires, processes which are known to naturally release Cu to the environment.

Silver

The concentration of Ag was exceeded at sites AQ/TAS 3, AQ/TAS 8 and AQ/TAS 12 when compared against the ANZECC (2000) Aquatic Ecosystem Guideline of 0.00005 mg/L. No Livestock Drinking Water Guideline value has been specified for Ag.

The highest average concentration of Ag was approximately 0.0004 mg/L with a maximum concentration of 0.001 mg/L at site AQ/TAS 3 approximately 20 times higher than the ANZECC (2000) Aquatic Ecosystem Guideline.

The levels of Ag are likely to be naturally occurring or may emanate from the upstream gemstone mining operations.

Wetlands – Total Metals

Exceedances of Al, Fe and Mn were observed at several wetland sites when compared against the ADWG and the LTV irrigation guidelines. These included AQ/TAS 8, AQ/TAS 3 and AQ/TAS 13.

These sites exceeded the ADWG for Aluminium (0.2 mg/L) with an average concentration between these sites of 1.06 mg/L.

The ADWG (0.3 mg/L) and LTV irrigation guideline value (0.2 mg/L) for Fe was also exceeded at each site with an average concentration between these sites of 1.65 mg/L.

Manganese exceeded the ADWG (0.5) and the LTV irrigation guideline value (0.2 mg/L) at one site (AQ/TAS 8) with a maximum concentration of 0.68 mg/L observed.

Pastoral Dams – Physio- chemical Analysis Results

The Pastoral Dams are located at sampling sites AQ/TAS 4 and AQ/TAS 6. Results indicate the average pH of these sites to be 8.16 with a maximum pH of 8.37 at site AQ/TAS 4. These results indicate site AQ/TAS 4 is basic in nature and these values exceed the Nogoa River Water Quality Objectives for Freshwater Lakes / Reservoirs (pH 6.5-8.0). However, pH did not exceed either the ANZECC (2000) aquatic ecosystem guideline values or the ANZECC (2000) Livestock Drinking Water guideline values.

DO levels were generally below the Freshwater Lakes / Reservoirs trigger value (90-110%) with an average DO concentration of 71.56% and a minimum of 46.6% at site AQ/TAS 6. The highest recorded maximum for DO was 103.9% which is within the acceptable trigger value range. The average concentration of DO was also below the ANZECC (2000) aquatic ecosystem guideline value (85-110%); however livestock drinking water guideline values have not been specified for DO.

The Freshwater Lakes / Reservoirs WQO for EC is <250 $\mu\text{S}/\text{cm}$. Results indicate that the majority of sampling rounds exceeded this value with an averaged EC of 856.75 $\mu\text{S}/\text{cm}$ at site AQ/TAS 4 and 1166.90 $\mu\text{S}/\text{cm}$ at site AQ/TAS 6. EC was, however, within the acceptable range specified by the ANZECC (2000) Aquatic Ecosystem Guideline (125-2200 $\mu\text{S}/\text{cm}$).

Total Nitrogen at site AQ/TAS 4 and AQ/TAS 6 exceeds the Freshwater Lakes / Reservoirs WQO for total Nitrogen (<0.35 mg/L) with an average concentration of 1.10 mg/L and 0.95 mg/L respectively. A minimum concentration of 0.5 mg/L was recorded at site AQ/TAS 6. Aquatic ecosystem guideline values and livestock drinking water guideline values have not been specified for total Nitrogen. In addition, results indicate that total Phosphorus exceeds the Freshwater Lakes / Reservoirs WQO (<0.01) with an average concentration of 0.09 mg/L at site AQ/TAS 4 and 0.17 mg/L at site AQ/TAS 6. This WQO is considerably more stringent than the ANZECC (2000) Aquatic Ecosystem Guideline value of 0.5 mg/L which was not exceeded during any sampling event.

Pastoral Dam – Dissolved Heavy Metals

Dissolved metal analysis results for the Pastoral Dam (refer to Table 15) indicate that water exceeds either the ANZECC (2000) Aquatic Ecosystem Guidelines for Al, Cu, Mn and Ag.

Aluminium

Results indicate the average level of aluminium (Al) concentration at each site to be within the ANZECC (2000) Aquatic Ecosystem guideline value which is 0.055 mg/L. The maximum concentration of Al at site AQ/TAS 4 was 0.08 mg/L and 0.06 mg/L at site AQ/TAS 6, only marginally above the ANZECC (2000) trigger value for Aquatic Ecosystems. This value does not exceed the ANZECC (2000) Livestock Drinking Water trigger value of 5 mg/L.

Observed levels of Al are likely to be naturally occurring.

Copper

Copper (Cu) was found to exceed the ANZECC (2000) Aquatic Ecosystem Guidelines of 0.0014 mg/L at site AQ/TAS 4 and AQ/TAS 6.

The maximum recorded concentration of Cu was 0.002 mg/L at AQ/TAS 4 and 0.003 at AQ/TAS 6, twice the Aquatic Ecosystem Guideline. However, the average concentration of Cu at each site was below the ANZECC (2000) Aquatic Ecosystem Guideline.

The observed Cu concentrations in surface waters are considered to be naturally elevated and may be due to windblown dust, decaying vegetation and forest fires, processes which are known to naturally release Cu to the environment.

Manganese

Mn exceeded the ANZECC (2000) Aquatic Ecosystem Guideline value of 1.9 mg/L only marginally at site AQ/TAS 6. The maximum concentration of Mn recorded at this site was 2.07 mg/L. No Livestock Drinking Water Guideline value has been specified for Mn.

Observed levels of Mn are likely to be naturally occurring.

Silver

The concentration of Ag was exceeded at site AQ/TAS 4 and site AQ/TAS 6 when compared against the ANZECC (2000) Aquatic Ecosystem Guideline of 0.00005 mg/L. No Livestock Drinking Water Guideline value has been specified for Ag.

The average concentration of Ag was approximately 0.0004 mg/L at site AQ/TAS 4 with a maximum concentration of 0.001 mg/L, approximately 20 times higher than the ANZECC (2000) Aquatic Ecosystem Guideline. The average and maximum concentration of Ag at site AQ/TAS 6 was 0.001 mg/L.

Although Ag occurs naturally in its pure free form as an alloy with other metals and also in minerals, most silver is produced as a by-product of copper, lead, gold and zinc refining. The levels of Ag are likely to be naturally occurring or may emanate from the upstream gemstone mining operations.

Pastoral Dams – Total Metals

Site AQ/TAS 4 experienced exceedances of Al (max 1.34 mg/L, avg 0.59 mg/L), Cd (max 0.07 mg/L, avg 0.01 mg/L), Cr (max 0.5 mg/L, avg 0.1 mg/L), Cu (max 1.8 mg/L, avg 0.36 mg/L), Fe (max 1.7 mg/L, avg 1.1 mg/L) and Mn (max 0.6 mg/L, avg 0.4 mg/L) when compared to either the ADWG and / or the LTV and STV guideline values.

AQ/TAS 6 experienced exceedances in Al (max 1.7 mg/L, avg 0.6 mg/L), Fe (max 1.9 mg/L, avg 0.7 mg/L) and Mn (max 2 mg/L, avg 1.1 mg/L) also when compared to either the ADWG and / or the LTV and STV guideline values.

Retreat Creek – Physio- chemical Analysis Results

The physio-chemical and biological monitoring results for Retreat Creek, traversing the northern portion of the Project site, indicate that water exceeds the trigger values provided in the Lower Nogoa / Theresa Creek WQOs (EHP 2011) at several sites for pH, DO, EC, TDS, Sulfate, Nitrite, Nitrate, total Nitrogen and total Phosphorus. The ANZECC (2000) Aquatic Ecosystem Guidelines were exceeded at several sites for pH, DO, EC and total Phosphorus and the ANZECC (2000) Livestock Drinking Water Guidelines were exceeded at several sites for TDS (refer to Table 18 and Table 19).

Results indicate water bodies associated with sampling sites AQ/TAS 5 and AQ/TAS 11 are basic in nature with an average pH between these sites of 8.53 with a maximum pH 9.08 recorded at site AQ/TAS 11.

Alkalinity is also important for fish and aquatic life because it protects or buffers against rapid pH changes. Higher alkalinity levels in surface waters will buffer acid rain and other acid wastes and prevent pH changes that are harmful to aquatic life (U.S. Geological Survey 2011). In addition, aquatic life reportedly function best in a pH range of 6.0 to 9.0, consistent with the majority of samples (Water Research Centre for Environmental Quality 2004).

DO is one of the primary determinants of fish presence in waterways located in arid regions (Glover 1982). DO levels were generally recorded within the ANZECC (2000) Aquatic Ecosystems Guideline and Lower Nogoa / Theresa Creek trigger values (85 – 110%), with the exception of several sites (AQ/TAS 1, AQ/TAS 2, and AQ/TAS 11) which exhibited low DO concentrations with an average concentration between these sites of approximately 68 %. The highest recorded maximum for DO was 145 % at site AQ/TAS 5. Total dissolved gas pressures exceeding 115% over a period of a few hours can cause the death of any fish exposed to these conditions (Boulton and Brock 1999). This condition is termed 'gas bubble disease' and is caused by the formation of bubbles in the tissues, which eventually accumulate in the gill capillaries, killing the fish (Boulton and Brock 1999). However, DO can change considerably, over a daily or diurnal period (ANZECC 2000).

Electrical Conductivity is one way to measure the inorganic materials including calcium, bicarbonate, nitrogen, phosphorus, iron, sulphur and other ions dissolved in a water body. Salinity is the component of conductivity that is critical to the survival of some aquatic plants and animals. Many species can survive only within certain salinity ranges so changes in salinity levels can result in changes to the variety and types of species found. The Lower Nogoa / Theresa Creek WQOs for EC are 250-340 $\mu\text{S}/\text{cm}$ which are considerably more stringent than the ANZECC (2000) Aquatic Ecosystem Guidelines of 125-2,200 $\mu\text{S}/\text{cm}$. All sites were outside the Lower Nogoa / Theresa Creek WQO for EC with the average EC ranging between 768 $\mu\text{S}/\text{cm}$ (AQ/TAS 5) and 2,302 $\mu\text{S}/\text{cm}$ (AQ/TAS 11). One site, AQ/TAS 11 also exceeded the ANZECC (2000) Aquatic Ecosystem Guideline with a maximum of 3,793 $\mu\text{S}/\text{cm}$.

Retreat Creek – Dissolved Heavy Metals

Heavy metal analysis results for Retreat Creek indicate that water exceeds either the ANZECC (2000) Aquatic Ecosystem Guidelines, the ANZECC (2000) Livestock Drinking Water Guidelines or both for Al, Cu, Mn, Ag and Zn (refer to Table 20).

Aluminium

Results from the metal analysis indicate locations AQ/TAS 2 and AQ/TAS 5 to be experiencing elevated levels of dissolved Al, exceeding the trigger values outlined in the ANZECC (2000) Guidelines for Aquatic Ecosystems Values.

Results indicate levels of Al to be up to 1.8 times higher than Aquatic Ecosystems guideline value of 0.055 mg/L, with site AQ/TAS 2 experiencing the highest level of Al returning a result of 0.1 mg/L.

These sampling sites occur within Retreat Creek, which flows in an easterly direction and has the potential to affect Theresa Creek and Nogoa River.

In the absence of industrial or mining disturbance, with no known history of or reason for contamination, the levels of Al are likely to be naturally occurring or may emanate from the upstream gemstone mining operations.

Copper

Copper (Cu) was found to exceed the ANZECC (2000) Aquatic Ecosystem Guidelines of 0.0014 mg/L at site AQ/TAS 11 and site AQ/TAS 5.

The average concentration of Cu at site AQ/TAS 5 was 0.002 mg/L (1.4 times higher than ANZECC (2000) Aquatic Ecosystem Guideline). Between sites AQ/TAS 5 and AQ/TAS 11 the average concentration of Cu was 0.0025 mg/L with a recorded maximum of 0.007 mg/L at site AQ/TAS 5, five times the ANZECC (2000) Aquatic Ecosystem Guideline for Cu.

The observed Cu concentrations in surface waters are considered to be naturally elevated and may be due to windblown dust, decaying vegetation and forest fires, processes which are known to naturally release Cu to the environment.

Manganese

Manganese (Mn) was elevated at site AQ/TAS 5, in comparison to the ANZECC (2000) Aquatic Ecosystem Guideline trigger value of 1.9 mg/L. The maximum concentration of Mn at AQ/TAS 5 was 2.45 mg/L.

A total of three samples were collected between 2011 and 2013 at this site and average concentrations were found to be lower than the ANZECC (2000) Aquatic Ecosystem Guideline trigger value with the highest average concentration of only 1.25 mg/L recorded.

Mn is considered to be naturally elevated.

Silver

Silver (Ag) exceeded the ANZECC (2000) Aquatic Ecosystem Guidelines of 0.00005 mg/L at sites AQ/TAS2 and AQ/TAS 5. Each of these sites recorded a maximum concentration of 0.0001 mg/L, 20 times higher than the guideline value.

Zinc

Zinc (Zn) concentrations were found to be elevated at three sites AQ/TAS 1, AQ/TAS 2 and AQ/TAS 11 in comparison to the ANZECC (2000) Aquatic Ecosystem Guideline of 0.008 mg/L. The average concentration of Zn across the three sites was 0.007 mg/L which is lower than the trigger value. The maximum concentration of Zn was recorded at site AQ/TAS 1 (0.018 mg/L), approximately twice the guideline value.

Retreat Creek – Total Metals

Exceedances of Al, Fe and Mn were observed at several sites on Retreat Creek when compared against the ADWG and the LTV irrigation guidelines. These included AQ/TAS 1, AQ/TAS 2, AQ/TAS 5 and AQ/TAS 11.

These sites exceeded the ADWG for Al (0.2 mg/L) with an average concentration between these sites of 1.02 mg/L.

The ADWG (0.3 mg/L) and LTV irrigation guideline value (0.2 mg/L) for Fe was also exceeded at each site with an average concentration between these sites of 1.45 mg/L.

Manganese exceeded the ADWG (0.5 mg/L) and the LTV irrigation guideline value (0.2 mg/L) at three sites (AQ/TAS 1, AQ/TAS 2 and AQ/TAS 5) with a maximum concentration of 3.9 mg/L recorded at site AQ5.

As was also exceeded the ADWG value of 0.01 mg/L at site AQ/TAS 5 with a maximum of .014 mg/L recorded. However the average concentration of As at this site was only 0.007 mg/L which is below the ADWG trigger value.

Taroborah Creek – Physio- chemical Analysis Results

The physio-chemical and biological monitoring results for Taroborah Creek, traversing the southern proportion of the Project site, are similar to the results observed for Retreat Creek and indicate that water exceeds the trigger values provided in either the Lower Nogo / Theresa Creek WQOs (EHP 2011), the ANZECC (2000) Aquatic Ecosystem 95% species protection Guidelines, or both at sites AQ/TAS 7 and AQ/TAS 10 for one or more of the following parameters: pH, DO, EC, TDS, Sulfate, Nitrite, Nitrate, total Nitrogen and total Phosphorus (refer to Table 23 and Table 24). The ANZECC (2000) Livestock Drinking Water Guidelines were exceeded at AQ/TAS 10 for TDS (refer to Table 23)

Results indicate water bodies associated with sampling sites AQ/TAS 7 and AQ/TAS 10 are basic in nature with an average pH between these sites of 8.78 with a maximum pH of 9.29 recorded at site AQ/TAS 10.

DO levels varied across each site with average concentrations of 67% at site AQ/TAS 7 and 140% at AQ/TAS 10 both outside the WQOs for both the ANZECC (2000) Aquatic Ecosystems Guideline and Lower Nogo / Theresa Creek trigger values (85 – 110%).

EC values for sites AQ/TAS 7 and AQ/TAS 10 were also outside the Lower Nogo / Theresa Creek WQO for EC (250-340 $\mu\text{S}/\text{cm}$) with average measurements of 988 $\mu\text{S}/\text{c}$ and 2,285 $\mu\text{S}/\text{cm}$ recorded respectively. It can be seen from these results that the average measured EC value recorded at site AQ/TAS 10 exceeded the ANZECC (2000) Aquatic Ecosystem Guideline of 125-2,200 $\mu\text{S}/\text{cm}$ by 85 $\mu\text{S}/\text{cm}$.

TDS was exceeded at both sites on Taroborah Creek however; one site AQ/TAS 10 also exceeded the ANZECC (2000) Livestock Drinking Water Guideline of 1,000 NTU with a maximum NTU of 2,795 recorded and an average of 1,787 NTU.

Taroborah Creek – Dissolved Heavy Metals

Results from the heavy metal analysis indicated elevated levels of B, Cu, Ni, and Ag at site AQ/TAS 10 with exceedances of Cu only experienced at site AQ/TAS 7 in comparison to the ANZECC (2000) Aquatic Ecosystem 95% species protection Guidelines (refer to Table 25).

Boron

Results indicate site AQ/TAS 10 had marginally elevated levels of Boron (B) when compared to the ANZECC (2000) Aquatic Ecosystem Guideline of 0.37 mg/L with a maximum recording of 0.38 mg/L. However, the average concentration of B was found to be only 0.28 mg/L which is within guideline trigger values.

Copper

The ANZECC (2000) Aquatic Ecosystem Guideline for Cu is 0.0014 mg/L and was exceeded at site AQ/TAS 7 which recorded a concentration of 0.002 mg/L during the single sampling event which took place. In addition, site AQ/TAS 10 also exceeded the ANZECC (2000) Aquatic Ecosystem Guideline for Cu with an average concentration of 0.005 mg/L and a maximum of 0.007 mg/L recorded, five times the guideline value.

Nickel

Although the average concentration of dissolved Nickel at site AQ/TAS10 was within the ANZECC (2000) Aquatic Ecosystem Guideline of 0.011 mg/L, the maximum concentration recorded at this site was 0.03 mg/L, almost three times the guideline limit.

Nickel occurs naturally in soils and is released to the atmosphere by windblown dust, combustion of fuel, municipal incineration and industries involved in steel production. In consideration to the rural setting of the Project and the absence of smelting and other nickel refining processes it is determined elevated levels of Nickel may be naturally occurring.

Silver

Elevated levels of Ag were also recorded at site AQ/TAS 10 consistent with the majority of results at various sampling sites. The maximum concentration of Ag recorded was 0.0006 mg/L, 12 times the guideline limit of 0.00005 mg/L.

Taraborah Creek – Total Metals

Exceedances of Al, Cd and Fe were observed at sites AQ/TAS 7 on Taraborah Creek when compared against the ADWG and the LTV irrigation guidelines.

Site AQ/TAS 7 exceeded the ADWG for Al (0.2 mg/L) with a maximum concentration of 2 mg/L and an average concentration of 1.09 mg/L. This site also exceeded the ADWG for Cd (0.002 mg/L) with a maximum concentration of 0.01 mg/L and an average of 0.002 mg/L which is below the guideline value.

The ADWG value for Fe (0.3 mg/L) and the LTV irrigation guideline value for Fe (0.2 mg/L) was also exceeded at site AQ/TAS 7 with an average concentration of 2.074 mg/L of Fe observed.

Site AQ/TAS 10 also exceeded the ADWG and the LTV irrigation guideline value for Al with a maximum concentration of 9.12 mg/L and an average of 1.95 mg/L.

The ADWG value for Fe (0.3 mg/L), As (0.003 mg/L), Ni (0.02 mg/L) and the LTV irrigation guideline value for Fe (0.2 mg/L) was also exceeded at site AQ/TAS 10 with maximum concentrations of Fe 8.09 mg/L, Ni 0.042 mg/L and As 0.006 mg/L observed.

6.3 SEDIMENT

Analytical results produced for the sediment samples have been compared against ANZECC trigger values for stream sediment quality (ANZECC 2000).

6.3.1 Metal Concentrations

The results of the sediment chemical analysis were compared to high and low Interim Sediment Quality Guidelines (ISQG) adopted by ANZECC (2000) for stream sediments, a summary of which is presented in **Error! Reference source not found.**. All sediment quality data collected for the Project during and following the aquatic ecology sediment sampling events is provided in Appendix D.

Chromium (Cr) and Nickel (Ni) were the only metals to exceed the ISQG values. Chromium exceeded the low ISQG value at four sites, AQ/TAS3, AQ/TAS4, AQ/TAS8 and AQ/TAS12. Nickel exceeded the low ISQG values at five sites (i.e. AQ/TAS1, AQ/TAS2, AQ/TAS9, AQ/TAS10 and AQ/TAS11) and the high ISQG values at four sites (i.e. AQ/TAS3, AQ/TAS4, AQ/TAS8 and AQ/TAS12).

Silver and antimony levels recorded for three sampling events were less than the limit of reporting (2 mg/kg and 5 mg/kg, respectively), which is above the low ISQG values for these metals. However, during the other sampling events, a lower limit of reporting was used and all samples tested below the low ISQG and therefore, the probability of silver and antimony exceeding the low ISQG value is considered to be low.

The guidelines state that in some areas natural mineralisation of stream sediments will mean that levels of some metals will be higher than the default low trigger values, or even the high trigger values, without any human interference. In these cases, site specific stream sediment low and high trigger levels should be determined from background data. In the interim, monitoring should continue to compare sediment metal concentrations to the low ISQG trigger values found in Table 3.5.1 of the ANZECC (2000) guidelines. In the absence of guidelines, Section 3.5.4.3 of the ANZECC (2000) guidelines recommend to derive a trigger value on the basis of natural background concentrations multiplied by a factor of two. Another alternative is to apply the water quality guideline values to sediment pore waters (ANZECC 2000).

Table 28 Retreat Creek - Summary of Sediment Quality Chemical Analytical Results

Retreat Creek		Total Metals															
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Zinc	Mercury
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ANZECC 2000 ISQG-Low trigger Value		2	20	-	-	1.5	80	-	65	50	-	-	21	-	1	200	0.15
ANZECC 2000 ISQG-High trigger Value		25	70	-	-	10	370	-	270	220	-	-	52	-	200	410	1
Site	Statistic																
AQ1 / TAS1	Mean	0.6	4.1	116.6	1.0	0.1	26.1	12.2	17.5	11.9	493.8	153.9	17.9	1	0.1	43.4	0.10
	Median	0.2	3.8	120.1	1.1	0.1	22.0	11.5	17.9	12.3	512.5	0.3	19.0	1	0.1	45.9	0.10
	Min	0.1	3.4	71.1	0.4	0.1	17.7	8.9	6.6	8.3	335	0.2	9.2	1	0.1	16.6	0.10
	Max	2	5.3	155	1.4	0.1	38.1	17.1	27.5	14.5	615	615.0	30.2	1	0.1	65.0	0.10
	80th Percentile	0.9	4.6	149.6	1.3	0.1	35.1	14.6	24.6	14.4	589.2	246.2	21.8	1	0.1	60.4	0.10
	95th Percentile	1.7	5.1	153.7	1.4	0.1	37.8	16.5	26.8	14.5	608.6	522.8	27.8	1	0.1	63.9	0.10
AQ2 / TAS2	Mean	0.1	3.1	127.425	1	0.1	30.5	12.6	19.2	10.7	439.0	89.5	24.9	1	0.1	45.6	0.10
	Median	0.1	2.95	136.5	1	0.1	31.1	13.5	21.0	11.5	402.5	0.3	26.0	1	0.1	48.7	0.10
	Min	0.1	2.8	92.7	0.7	0.1	21.7	9	12.5	8.2	357.0	0.2	16.1	1	0.1	34.4	0.10
	Max	0.2	3.7	144	1.1	0.1	37.9	14.3	22.2	11.8	594.0	357.0	32.4	1	0.1	50.6	0.10
	80th Percentile	0.14	3.34	143.4	1.1	0.1	37.4	14.1	22.0	11.6	502.8	143.0	29.9	1	0.1	49.8	0.10
	95th Percentile	0.2	3.6	143.9	1.1	0.1	37.8	14.3	22.1	11.8	571.2	303.5	32.0	1	0.1	50.4	0.10
AQ3 / TAS3	Mean	0.1	0.7	131.0	0.4	0.1	87.9	35.0	27.8	1.5	524.5	110.6	113.0	1	0.1	62.0	0.10
	Median	0.1	0.7	121	0.4	0.1	78.5	34.9	27.3	1.6	511.5	0.5	126.0	1	0.1	62.4	0.10
	Min	0.1	0.5	99.1	0.3	0.1	65.4	31.2	24	1.4	441.0	0.3	45.0	1	0.1	55.0	0.10
	Max	0.1	0.8	183	0.5	0.1	123.0	39.1	32.4	1.6	634.0	441.0	139.0	1	0.1	68.2	0.10
	80th Percentile	0.1	0.7	148.2	0.4	0.1	111.9	37.8	29.9	1.6	597.4	176.7	134.8	1	0.1	65.3	0.10
	95th Percentile	0.1	0.8	174.3	0.5	0.1	121.5	38.8	31.8	1.6	624.9	374.9	137.8	1	0.1	67.5	0.10
AQ4 / TAS4	Mean	0.1	2.6	157.7	1.0	0.1	75.3	26.5	34.6	9.2	1048.3	533.6	73.2	1	0.1	56.8	0.10
	Median	0.1	2.4	157	1	0.1	73.0	29.7	33.4	8.9	1090.0	0.4	66.0	1	0.1	55.6	0.10
	Min	0.1	1.9	156	0.7	0.1	31.9	14.4	24	4.9	455.0	0.3	27.1	1	0.1	53.3	0.10
	Max	0.2	3.4	160	1.4	0.1	111.0	35.3	46.5	13.9	1600.0	1600.0	118.0	1	0.1	61.4	0.10
	80th Percentile	0.2	3	158.8	1.24	0.1	102.2	33.1	41.3	11.9	1396.0	960.2	102.6	1	0.1	59.1	0.10
	95th Percentile	0.2	3.3	159.7	1.36	0.1	108.8	34.7	45.2	13.4	1549.0	1440.0	114.1	1	0.1	60.8	0.10
AQ5 / TAS5	Mean	0.1	3.3	92.7	0.7	0.1	12.6	7.6	11.7	8.6	486.0	249.4	10.8	1	0.1	32.6	0.10
	Median	0.1	3	118	0.8	0.1	16.5	8.9	14.4	10.2	560.0	0.2	14.7	1	0.1	38.9	0.10
	Min	0.1	2.7	21.2	0.2	0.1	3.0	2.6	2	3.2	150.0	0.1	2.5	1	0.1	6.9	0.10
	Max	0.2	4.3	139	1.1	0.1	23.0	11.4	18.6	12.4	748.0	748.0	18.7	1	0.1	52.0	0.10
	80th Percentile	0.2	3.8	130.6	0.98	0.1	18.2	10.4	16.92	11.5	672.8	448.9	15.7	1	0.1	46.8	0.10
	95th Percentile	0.2	4.2	136.9	1.07	0.1	21.8	11.2	18.2	12.2	729.2	673.2	18.0	1	0.1	50.7	0.10

Retreat Creek		Total Metals															
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Zinc	Mercury
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ANZECC 2000 ISQG-Low trigger Value		2	20	-	-	1.5	80	-	65	50	-	-	21	-	1	200	0.15
ANZECC 2000 ISQG-High trigger Value		25	70	-	-	10	370	-	270	220	-	-	52	-	200	410	1
Site	Statistic																
AQ6 / TAS6	Mean	0.1	4.9	64.5	0.5	0.1	9.3	5.9	6.7	6.4	231.7	89.1	8.2	1	0.1	21.5	0.10
	Median	0.1	3	57	0.4	0.1	4.7	5.3	4	5.4	267.0	0.2	4.4	1	0.1	13.9	0.10
	Min	0.1	2.8	19.6	0.3	0.1	3.0	4.2	3.1	4.5	108.0	0.1	2.9	1	0.1	11.7	0.10
	Max	0.1	8.9	117	0.8	0.1	20.0	8.3	12.9	9.4	320.0	267.0	18.0	1	0.1	39.0	0.10
	80th Percentile	0.1	6.5	93	0.64	0.1	15.9	7.1	9.3	7.8	298.8	160.3	13.8	1	0.1	29.0	0.10
	95th Percentile	0.1	8.3	111	0.76	0.1	19.0	8	12.0	9.0	314.7	240.3	17.0	1	0.1	36.5	0.10
AQ8 / TAS8	Mean	0.1	1.1	203.7	1.5	0.1	63.5	26.4	33.9	7.7	751.3	266.8	58.0	1	0.1	76.2	0.10
	Median	0.1	1	204	1.6	0.1	66.0	26.2	36.5	8.5	754.0	0.3	57.6	1	0.1	81.3	0.10
	Min	0.1	1	173	1.2	0.1	28.0	23.6	27.4	5.7	700.0	0.2	19.0	1	0.1	59.3	0.10
	Max	0.1	1.2	234	1.6	0.1	93.0	29.4	37.7	8.8	800.0	800.0	111.0	1	0.1	87.9	0.10
	80th Percentile	0.1	1.1	222	1.6	0.1	74.2	28.1	37.2	8.7	781.6	480.1	60.5	1	0.1	85.3	0.10
	95th Percentile	0.1	1.2	231	1.6	0.1	88.3	29.1	37.6	8.8	795.4	720.0	98.4	1	0.1	87.2	0.10
AQ11 / TAS11	Mean	0.1	0.8	68.6	0.2	0.1	28.3	9.3	9.5	1.9	181.0	47.1	23.7	1	0.1	11.6	0.10
	Median	0.1	0.8	80.4	0.2	0.1	30.6	10.4	10.5	1.9	207.5	0.2	27.9	1	0.1	13.3	0.10
	Min	0.1	0.5	32	0.2	0.1	11.0	4.8	4.8	1.6	72.8	0.1	6.0	1	0.1	4.4	0.10
	Max	0.1	1	81.6	0.3	0.1	47.0	11.7	12.2	2.1	236.0	188.0	40.0	1	0.1	15.3	0.10
	80th Percentile	0.1	0.9	81.1	0.2	0.1	35.9	11.4	11.7	2.0	230.6	75.3	30.9	1	0.1	14.1	0.10
	95th Percentile	0.1	1.0	81.5	0.3	0.1	44.2	11.6	12.1	2.1	234.7	159.8	37.7	1	0.1	15.0	0.10
AQ12 / TAS12	Mean	0.1	1.05	142	0.55	0.1	69.0	26.9	28.8	4.1	834.5	252.9	61.0	1	0.1	34.9	0.10
	Median	0.1	1.05	146	0.6	0.1	67.0	28.1	30.6	4.3	830.0	0.7	57.3	1	0.1	34.2	0.10
	Min	0.1	0.8	110	0.4	0.1	55.4	19.2	22.1	3.2	428.0	0.3	46.0	1	0.1	25.4	0.10
	Max	0.1	1.3	166	0.6	0.1	86.8	32.4	31.9	4.8	1250.0	1010.0	84.8	1	0.1	45.7	0.10
	80th Percentile	0.1	1.3	158.8	0.6	0.1	76.6	31.4	31.5	4.8	1106.0	404.5	72.2	1	0.1	41.7	0.10
	95th Percentile	0.1	1.3	164.2	0.6	0.1	84.3	32.1	31.8	4.8	1214.0	858.6	81.7	1	0.1	44.7	0.10

Table 29 Taraborah Creek - Summary of Sediment Quality Chemical Analytical Results

Taraborah Creek		Total Metals															
		Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Zinc	Mercury
		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
ANZECC 2000 ISQG-Low		2	20	-	-	1.5	80	-	65	50	-	-	21	-	1	200	0.15
ANZECC 2000 ISQG-High		25	70	-	-	10	370	-	270	220	-	-	52	-	200	410	1
Site	Statistic																
AQ7 / TAS7	Mean	0.1	0.3	75.1	0.1	0.1	11.3	11.0	4.0	1.1	420.3	146.3	7.8	1	0.1	3.8	0.10
	Median	0.1	0.3	70.8	0.1	0.1	10.6	8.7	3.6	0.9	376.0	0.1	6.4	1	0.1	3.2	0.10
	Min	0.1	0.2	64	0.1	0.1	7.8	6	2.3	0.8	344.0	0.1	5.2	1	0.1	2.4	0.10
	Max	0.1	0.3	94.6	0.2	0.1	17.0	20.4	6.6	1.8	585.0	585.0	13.9	1	0.1	6.5	0.10
	80th Percentile	0.1	0.3	80.9	0.1	0.1	11.8	13.7	5.1	1.3	465.6	234.1	9.0	1	0.1	4.6	0.10
	95th Percentile	0.1	0.3	91.2	0.2	0.1	15.5	18.7	6.2	1.7	555.2	497.3	12.4	1	0.1	6.0	0.10
AQ9 / TAS9	Mean	0.1	0.7	153.8	0.5	0.1	37.9	18.7	10.13	4.6	749.8	160.9	18.8	1	0.1	9.1	0.10
	Median	0.1	0.7	168.5	0.6	0.1	40.3	18.4	11.05	5.3	724.5	0.3	20.0	1	0.1	9.6	0.10
	Min	0.1	0.5	56.2	0.1	0.1	13.7	10	6.5	1.2	420.0	0.1	5.4	1	0.1	4.1	0.10
	Max	0.1	1.1	222	0.6	0.1	47.1	28	11.9	6.5	1130.0	643.0	24.2	1	0.1	12.9	0.10
	80th Percentile	0.1	0.9	213.6	0.6	0.1	45.2	22.3	11.9	5.8	935.6	257.4	23.9	1	0.1	12.1	0.10
	95th Percentile	0.1	1.0	219.9	0.6	0.1	46.8	26.58	11.9	6.3	1081.4	546.6	24.1	1	0.1	12.7	0.10
AQ10 / TAS10	Mean	0.1	0.5	108.8	0.2	0.1	17.0	12.1	5.8	1.5	547.8	212.8	18.8	1	0.1	6.5	0.10
	Median	0.1	0.5	107.9	0.2	0.1	16.1	12.5	5.5	1.5	497.0	0.1	17.0	1	0.1	6.3	0.10
	Min	0.1	0.2	73.4	0.2	0.1	14.0	7.4	4.4	1.1	346.0	0.1	14.8	1	0.1	6.0	0.10
	Max	0.1	0.9	146	0.3	0.1	21.0	15.8	7.6	1.8	851.0	851.0	25.0	1	0.1	7.5	0.10
	80th Percentile	0.1	0.7	129.2	0.2	0.1	18.7	14.9	6.5	1.7	666.2	340.5	23.0	1	0.1	6.8	0.10
	95th Percentile	0.1	0.8	141.8	0.3	0.1	20.4	15.6	7.3	1.8	804.8	723.4	24.8	1	0.1	7.3	0.10
AQ13	Mean	-	5	50	1	1	16.0	5	6	5	185	2	10.5	5	-	9.5	0.10
	Median	-	5	50	1	1	16.0	5	6	5	185	2	10.5	5	-	9.5	0.10
	Min	-	5	30	1	1	6.0	3	5	5	106	2	4.0	5	-	8	0.10
	Max	-	5	70	1	1	26.0	7	7	5	264	2	17.0	5	-	11	0.10
	80th Percentile	-	5	62	1	1	22.0	6.2	6.6	5	232.4	2	14.4	5	-	10.4	0.10
	95th Percentile	-	5	68	1	1	25.0	6.8	6.9	5	256.1	2	16.4	5	-	10.9	0.10

Retreat Creek Sediments – Total Metal Concentration

Heavy metal analysis indicates Cr and Ni are in exceedance of the ANZECC (2000) stream sediment quality trigger values at several sites as outlined in Table 28 and described below.

Chromium

The results of metal analysis indicated Cr was exceeded at three sites (AQ/TAS 3, AQ/TAS 4 and AQ/TAS 12) when compared to the ANZECC (2000) stream sediment quality trigger values. Only the low ISQG trigger value of 80 mg/kg was exceeded with a maximum concentration of 100 mg/kg recorded at site AQ/TAS 4. The average concentration at each site, however, was within the ANZECC (2000) stream sediment quality trigger values with a mean concentration of 70.8 mg/kg recorded between sites.

Cr is known to naturally exist in soils and rocks and the slightly elevated levels found in Retreat Creek may be due to the catchment runoff passing over these soils entering the waterway.

Nickel

Ni was found to exceed the ISQG Low trigger value of 21 mg/kg at seven sites including AQ/TAS 1, AQ/TAS 2, AQ/TAS 3, AQ/TAS 4, AQ/TAS 8, AQ/TAS 11 and AQ/TAS 12 in addition to the ISQG High trigger value of 52 mg/kg at sites AQ/TAS 3, AQ/TAS 4 and AQ/TAS 8.

The highest recorded maximum of 135 mg/kg was recorded at site AQ3 together with the highest recorded average of 124 mg/kg. The average concentration of Ni among those sites exceeding only the ISQG Low trigger value (AQ/TAS 1, AQ/TAS 2 and AQ/TAS 11) was 22.8 mg/kg only marginally outside the guideline value. The average concentration among those sites exceeding only the ISQG High trigger value (AQ/TAS 3, AQ/TAS 4 and AQ/TAS 8 and AQ/TAS 12) was 76.0 mg/kg.

In consideration to the rural setting of the Project and the absence of smelting and other nickel refining processes it is determined elevated levels of Ni may be naturally occurring.

Taraborah Creek Sediments– Total Metal Concentration

Heavy metal analysis indicates Ni is in exceedance of the ANZECC (2000) stream sediment quality trigger values at two sites as outlined in Table 29 and described below.

Nickel

Elevated levels of Ni were recorded at sites AQ/TAS 9 and AQ/TAS 10 in comparison to the ISQG Low trigger value of 21 mg/kg. Exceedances were only marginal however with site AQ/TAS 9 recording a maximum concentration of 24.2 mg/kg and an average concentration of 19.2 mg/kg which is under the guideline value. Site AQ/TAS 10 recorded a maximum concentration of 24.3 mg/kg and an average of 18 mg/kg, also under the guideline value. Similar to Retreat Creek, Ni may be naturally elevated in Taraborah Creek due to natural weathering processes.

6.3.2 Particle Size

Stream substrates within the Project site vary between sampling sites (Table 30 and Figure 10). Sampling sites TAS1, TAS5, TAS8, TAS12, AQ01, AQ02, AQ04, AQ05, AQ06, AQ08 and AQ12 exhibited the highest percentage of fine sediment (clay particles <2 micrometre (µm) and silt of 2 - 60µm). The fine sediments (with a larger clay component) permit water to be retained for longer. The stream substrates of Taroborah Creek (AQ07, AQ09 and AQ10) are predominantly comprised of sands; which is depicted below in Table 30 and Figure 10. The low proportion of cobbles in all samples is most likely attributable to sampling method, as the size of the jars and method of obtaining samples favours smaller particles. Cobbles were noted at several sampling sites, including TAS3, TAS7, TAS10, TAS11, AQ01 and AQ11.

Table 30 Particle Size Results

Site	Unit	Fines (<75 µm)	Sand (>75 µm)	Gravel (>2mm)	Cobbles (>6cm)
TAS1	%	83	16	1	< 1
TAS2	%	59	40	1	< 1
TAS3	%	47	2	50	< 1
TAS4	%	94	5	< 1	< 1
TAS5	%	3	83	14	< 1
TAS6	%	60	39	1	< 1
TAS7	%	2	89	9	< 1
TAS8	%	99	1	< 1	< 1
TAS9	%	29	54	16	< 1
TAS10	%	11	82	7	< 1
TAS11	%	20	55	25	< 1
TAS12	%	72	27	1	< 1
AQ1	%	84	16	< 1	< 1
AQ2	%	76	24	< 1	< 1
AQ4	%	84	15	1	< 1
AQ5	%	79	21	< 1	< 1
AQ6	%	76	24	< 1	< 1
AQ7	%	5	88	7	< 1

Site	Unit	Fines ($<75\ \mu\text{m}$)	Sand ($>75\ \mu\text{m}$)	Gravel ($>2\text{mm}$)	Cobbles ($>6\text{cm}$)
AQ8	%	90	10	< 1	< 1
AQ9	%	33	64	3	< 1
AQ10	%	23	70	7	< 1
AQ11	%	20	78	2	< 1
AQ12	%	88	12	< 1	< 1
AQ13	%	50	49	1	< 1

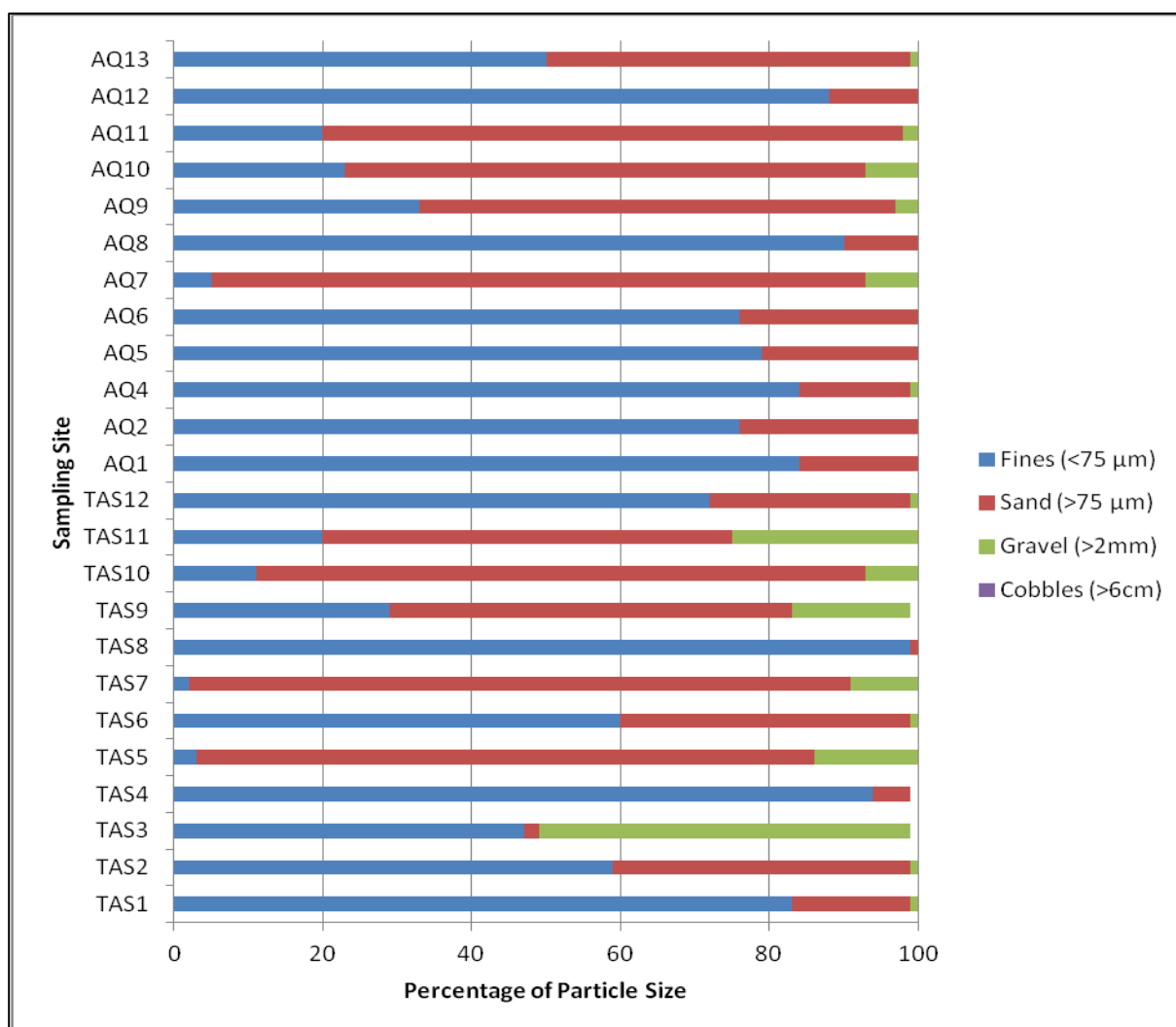


Figure 10 Stream Sediment Particle Size Distribution

6.4 AQUATIC AND RIPARIAN VEGETATION

Riparian vegetation associated with Retreat Creek is characteristic of the River Red Gum (*Eucalyptus camaldulensis*) riparian woodland community known as Regional Ecosystem 11.3.25. Vegetation fringing Retreat Creek is generally co-dominated by River Red Gum and Coolabah (*Eucalyptus coolabah*), although Forest Red Gum (*Eucalyptus tereticornis*) replaces River Red Gum in some areas. Belah (*Casuarina cristata*) occurs commonly throughout the community. Mid-storey species include River Tea Tree (*Melaleuca bracteata*), Dogwood (*Eremophila longifolia*), Red Ash (*Alphitonia excelsa*) and Creek Sandpaper Fig (*Ficus coronata*).

The riparian community associated with Taroborah Creek is characteristic of the River Tea Tree (*Melaleuca bracteata*) riparian woodland community known as Regional Ecosystem 11.3.3a. This community is generally dominated by River Tea Tree, while Belah occurs commonly. Occasional canopy species include Ghost Gum (*Corymbia dallachiana*) and Poplar Box (*Eucalyptus populnea*). Mid-storey species associated with this community include Queensland Ebony (*Lysiphyllum hookeri*) and Mimosa (*Acacia farnesiana*).

Smaller creeks, drainage lines and pastoral dams are typically vegetated with the same species as the surrounding areas (woodlands, grasslands, etc.).

Aquatic and riparian vegetation communities occurring on the Project site are discussed in detail in Section 6.4.1 below. The locations of each community are shown in Figure 11.

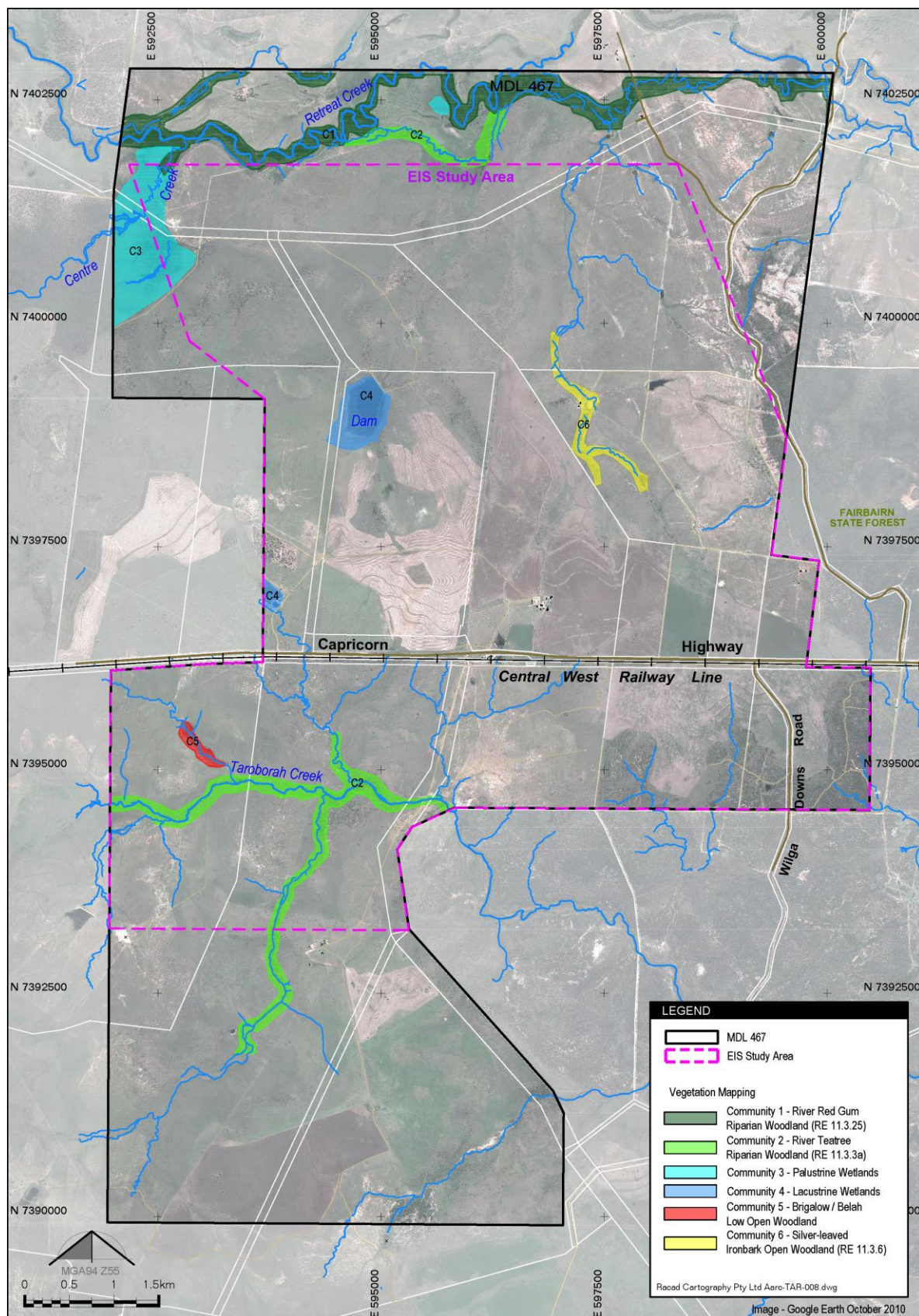


Figure 11 Aquatic and Riparian Vegetation on the Project Site

6.4.1 Vegetation Communities

6.4.1.1 Community 1 – River Red Gum Riparian Woodland (RE 11.3.25)

Location

The River Red Gum (*Eucalyptus camaldulensis*) Riparian Woodland (Photo Plate 1) occurs along Retreat Creek in the north of the Project site.

Community Description

Woody Species

The canopy of this community is dominated by River Red Gum. Associated species forming a canopy layer to approximately 15 m tall include Dawson Gum (*E. cambageana*), Forest Red Gum (*E. tereticornis*), Belah (*Casuarina cristata*) and River She-oak (*C. cunninghamiana*). The shrub layer is dominated by Doolan (*Acacia salicina*) and Sandpaper Fig (*Ficus opposita*), with many associated species, including Red Bauhinia (*Lysiphyllum cunninghamii*), Erythroxylum (*Erythroxylum australe*), Weeping Bottlebrush (*Melaleuca viminalis*), River Teatree (*M. bracteata*) and *Eremophila* species. Currant Bush (*Carissa ovata*) is also commonly encountered in this community. The weed Parkinsonia (*Parkinsonia aculeata*), which is a declared Class 2 weed under the LP Act, is common within this community. Dominant flora is summarised in Table 31. Stem counts within a secondary transect gave 13 shrub stems and 21 tree stems.

Groundcover

The ground layer comprises a co-dominant mix of native flora species such as Umbrella Canegrass (*Leptochloa digitata*), Hairy Panic (*Panicum effusum*) and Musk Basil (*Basilicum polystachyon*) with a sub-dominant presence of the introduced species, Buffel Grass (*Cenchrus ciliaris*). Buffel Grass is less dominant within this RE than other areas of the Project site. Other commonly encountered groundcover species include *Senecio brigalowensis*, Long-leaved Matrush (*Lomandra longifolia*), River Bitter-cress (*Rorippa eustylis*) and the introduced Variegated Thistle (*Silybum marianum*). The declared Class 2 weed, Parthenium (*Parthenium hysterophorus*) is also present in this RE. Dominant flora is summarised in Table 31. A secondary transect consisted of 36% grass and sedge cover, 42 % herb cover, 8% leaf litter and 14% bare ground.



Photo Plate 1 Community 1 – River Red Gum (*Eucalyptus camaldulensis*) Riparian Woodland

Table 31 Dominant flora of Community 1 – River Red Gum Riparian Woodland (RE 11.3.25)

Layer	Relative Dominance	Scientific Name	Common Name
Canopy	Dominant	<i>Eucalyptus camaldulensis</i> subsp. <i>acuta</i>	River Red Gum
	Associated	<i>Eucalyptus cambageana</i>	Dawson Gum
	Occasional	<i>Casuarina cristata</i>	Belah
	Occasional	<i>Casuarina cunninghamiana</i>	River She-oak
	Occasional	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Shrub	Co-dominant	<i>Acacia salicina</i>	Doolan
	Co-dominant	<i>Ficus opposita</i>	Sandpaper Fig
	Associated	<i>Acacia farnesiana</i> *	Mimosa Bush
	Associated	<i>Eremophila</i> sp.	
	Associated	<i>Lysiphyllum cunninghamii</i>	Red Bauhinia
	Associated	<i>Melaleuca bracteata</i>	River Teatree
	Associated	<i>Parkinsonia aculeata</i> *	Parkinsonia
	Occasional	<i>Erythroxylum australe</i>	Erythroxylum
	Occasional	<i>Melaleuca viminalis</i>	Weeping Bottlebrush
Ground	Co-dominant	<i>Cenchrus ciliaris</i> *	Buffel Grass
	Co-dominant	<i>Leptochloa digitata</i>	Umbrella Canegrass
	Co-dominant	<i>Panicum effusum</i>	Hairy Panic
	Co-dominant	<i>Senecio bragalowensis</i>	
	Associated	<i>Basilicum polystachyon</i>	Musk Basil
	Associated	<i>Lomandra longifolia</i>	Long-leaved Matrush
	Associated	<i>Silybum marianum</i> *	Variegated Thistle
	Occasional	<i>Carissa ovata</i>	Currant Bush
	Occasional	<i>Rorippa eustylis</i>	River Bitter-cress
	Occasional	<i>Senecio madagascariensis</i> *	Fireweed

* introduced species

Conservation Status

This community is consistent with RE 11.3.25, which is described by the Regional Ecosystem Description Database (REDD) (Queensland Herbarium 2011) as “*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines”. RE 11.3.25 is listed as “Least Concern” under the VM Act, although it has an EHP Biodiversity Status of “Of Concern”. This community is not listed under the federal EPBC Act. No flora species of conservation significance were recorded within the River Red Gum Riparian Woodland.

6.4.1.2 Community 2 – River Teatree Riparian Woodland (RE 11.3.3a)

Location

The River Teatree (*Melaleuca bracteata*) Riparian Woodland (Photo Plate 2) occurs in the south of the Project site in association with Taraborah Creek.

Community Description

Woody Species

This community is characterised by a canopy, dominated by River Teatree, fringing the ephemeral watercourse. Coolabah (*Eucalyptus coolabah*) is the dominant emergent species, while Dallachy's Gum (*Corymbia dallachiana*) occurs sporadically. The open shrub layer is co-dominated by River She-oak and Red Bauhinia. Infrequent midstorey species include Wilga (*Geijera parviflora*), Holly Bush (*Alectryon diversifolius*), and Whitewood (*Atalaya hemiglauca*). Introduced Mimosa Bush occurs commonly throughout the shrub layer. Dominant flora is summarised in Table 32. Stem counts within a *Secondary* Transect recorded 2 shrub stems and 7 tree stems.

Groundcover

The ground layer consists of a dense cover of grasses that is dominated by Buffel Grass. Other groundcover species present include Kangaroo Grass (*Themeda triandra*), Spicetop (*Capillipedium spicigerum*), Spiked Sida (*Sida hackettiana*), Flannel Weed (*Sida cordifolia*) and Fireweed (*Senecio madagascariensis*). Fireweed is a declared Class 2 pest plant as listed under the LP Act and a Weed of National Significance (WONS). A *Secondary* Transect within this community consisted of 74% grass and sedge cover, 16 % herb cover, 2% leaf litter and 8% bare ground.



Photo Plate 2 Community 2 – River Teatree (*Melaleuca bracteata*) Riparian Woodland

Table 32 Dominant flora of Community 2 – River Teatree Riparian Woodland (RE 11.3.3a)

Layer	Relative Dominance	Scientific Name	Common Name
Canopy	Dominant	<i>Melaleuca bracteata</i>	River Tea tree
	Associated	<i>Casuarina cristata</i>	Belah
	Associated	<i>Eucalyptus coolabah</i>	Coolabah
	Occasional	<i>Corymbia dallachiana</i>	Dallachy's Gum
	Occasional	<i>Eucalyptus populnea</i>	Poplar Box
	Occasional	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
Shrub	Co-dominant	<i>Casuarina cunninghamiana</i>	River She-oak
	Co-dominant	<i>Lysiphyllum cunninghamii</i>	Bauhinia
	Associated	<i>Acacia farnesiana</i> *	Mimosa Bush
	Occasional	<i>Acacia harpophylla</i>	Brigalow
	Occasional	<i>Atalaya hemiglauca</i>	Whitewood

Layer	Relative Dominance	Scientific Name	Common Name
	Occasional	<i>Alectryon diversifolius</i>	Holly Bush
	Occasional	<i>Geijera parviflora</i>	Wilga
Ground	Dominant	<i>Cenchrus ciliaris</i> *	Buffel Grass
	Occasional	<i>Senecia madagascariensis</i> *	Fireweed
	Occasional	<i>Themeda triandra</i>	Kangaroo Grass
	Occasional	<i>Sida hackettiana</i>	Spiked Sida
	Occasional	<i>Sida cordifolia</i> *	Flannel Weed

* introduced species

Conservation Status

This community is considered to be consistent with RE 11.3.3a. RE 11.3.3 is described by the REDD (Queensland Herbarium 2011) as “*Eucalyptus coolabah* woodland on alluvial plains” and the subcategory RE 11.3.3a is described as “Riverine wetland or fringing riverine wetland – *Melaleuca bracteata* woodland on alluvial plains”.

RE 11.3.3 is listed by the EHP Biodiversity Status and Vegetation Management Act as “Of Concern”. This community is not listed under the EPBC Act. No flora species of conservation significance were recorded within the River Teatree Riparian Woodland.

6.4.1.3 Community 3 – Palustrine Wetland (RE 11.3.27)

Location

This community occurs in association with the palustrine wetlands (Photo Plate 3) located in the north of the Project site (Figure 11). The locations of this community are generally consistent with the palustrine wetlands mapped by EHP (Figure 6). However, ground truthing revealed that the extent of this community in the north-west corner of the site is larger than the EHP mapped wetlands, incorporating two palustrine wetlands occurring in close proximity to each other.

Community Description

Woody Species

Woody species diversity within this community is limited to Mimosa Bush and Lignum (*Muehlenbeckia florulenta*) with occasional juvenile Eucalypts (*Eucalyptus* sp.). A secondary transect woody stem count recorded 8 shrub stems.

Groundcover

The ground layer consists of a co-dominant composition of native Umbrella Canegrass and introduced Nutgrass (*Cyperus rotundus*). Buffel Grass occurs throughout this community as a sub-dominant species. Native occasional ground layer species include *Panicum decompositum* var. *decompositum*, Sesbania Pea (*Sesbania cannabina*) and Common Nardoo (*Marsilea drummondii*). Exotic



groundcover species include Fireweed and Variegated Thistle. A secondary transect within this community consisted of 38% grass cover, 60% sedge cover and 2% cover of herbs.

A list of the dominant flora species associated with the Palustrine Wetlands is provided in Table 33.



Photo Plate 3 Community 3 – Palustrine Wetland

Table 33 Dominant Flora of Community 3 – Palustrine Wetland

Layer	Relative Dominance	Scientific Name	Common Name
Shrub (0 – 3 m)	Dominant	<i>Acacia farnesiana</i> *	Mimosa Bush
	Occasional	<i>Muehlenbeckia florulenta</i>	Lignum
	Occasional	<i>Eucalyptus</i> sp. (juvenile)	-
Ground (0 – 2 m)	Co-dominant	<i>Leptochloa digitata</i>	Umbrella Canegrass
	Co-dominant	<i>Cyperus rotundus</i> *	Nutgrass
	Associated	<i>Cenchrus ciliaris</i> *	Buffel Grass

Layer	Relative Dominance	Scientific Name	Common Name
	Occasional	<i>Senecio madagascariensis</i> *	Fireweed
	Occasional	<i>Silybum marianum</i> *	Variegated Thistle
	Occasional	<i>Marsilea drummondii</i>	Common Nardoo
	Occasional	<i>Panicum decompositum</i> var. <i>decompositum</i>	-
	Occasional	<i>Sesbania cannabina</i>	Sesbania Pea

* introduced species

Conservation Status

This community is considered to be consistent with RE 11.3.27, which is described by the REDD (Queensland Herbarium 2011) as “Lacustrine wetland (e.g. lake). May be *Muehlenbeckia florulenta* low shrubland +/- scattered *E. coolabah* trees fringing or scattered across the area”. RE 11.3.27 is listed as “Least Concern” under the VM Act and “Of Concern” under the DEHP Biodiversity Status. This community is not listed under the federal EPBC Act.

Despite targeted searches, no flora species of conservation significance were recorded from this community.

6.4.1.4 Community 4 – Lacustrine Wetland

Location

Community 4 occurs in association with two Lacustrine wetlands (Photo Plate 4) located in the central-west of the Project site (Figure 11).

Community Description

Woody species

This community contains a very sparse canopy layer consisting of regrowth Brigalow to a height of 8 m. The shrub layer occurs to a height of 2 m and is dominated by exotic species including Mimosa Bush, Parthenium and Parkinsonia. Two of these species, Parthenium and Parkinsonia are listed as Weeds of National Significance and Class 2 declared pest plants under the LP Act. The woody stem count completed within a secondary transect recorded one Brigalow stem.

Groundcover

The ground layer exhibits a co-dominant composition of White Smartweed (*Persicaria attenuata* subsp. *attenuata*) and Couch (*Cynodon dactylon* var. *dactylon*). In some areas, Couch is replaced by Buffel Grass as the co-dominant species. Awnless Barnyard Grass occurs in association with this community. Johnson Grass (*Sorghum halepense*) occurs on occasion as a result of the surrounding sorghum cropping land use. Occasional sedges present include *Cyperus dactyloides* and Pale Spikerush (*Eleocharis pallens*). A secondary transect within this community consisted of 18% aquatic emergents, 47% grass cover, 6% herbs and 32% cover of regenerating shrub species.



A list of the more commonly encountered flora species of Community 4 is provided in Table 34.



Photo Plate 4 Community 4 – Lacustrine Wetland

Table 34 Dominant Flora of Community 4 – Lacustrine Wetland

Layer	Relative Dominance	Scientific Name	Common Name
Canopy (6 – 8 m)	Occasional	<i>Acacia harpophylla</i>	Brigalow
Shrub (1 – 2 m)	Occasional	<i>Acacia farnesiana</i> *	Mimosa Bush
	Occasional	<i>Parthenium hysterophorus</i> *	Parthenium
	Associated	<i>Parkinsonia aculeata</i> *	Parkinsonia
Ground (0 – 1 m)	Co-dominant	<i>Persicaria attenuata</i> subsp. <i>attenuata</i>	White Smartweed
	Co-dominant	<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch
	Associated	<i>Cenchrus ciliaris</i> *	Buffel Grass
	Associated	<i>Echinochloa colona</i> *	Awnless Barnyard Grass

Layer	Relative Dominance	Scientific Name	Common Name
	Occasional	<i>Sorghum halepense</i> *	Johnson Grass
	Occasional	<i>Eleocharis pallens</i>	Pale Spikerush
	Occasional	<i>Cyperus dactylotes</i>	-

* introduced species

Conservation Status

Community 4 is not consistent with any regional ecosystems as described by the REDD (Queensland Herbarium 2011). This community is not listed under the federal EPBC Act. No flora species of conservation significance were recorded from this community.

6.4.1.5 Community 5 – Brigalow / Belah Low Open Woodland

Location

This Brigalow/Belah Low Open Woodland community (Photo Plate 5) is located in the south-west portion of the Project site and occurs in association with a drainage line to Taroborah Creek. This community also occurs in a highly disturbed state along drainage lines associated with Retreat Creek and Taroborah Creek.

Community Description

Woody Species

The canopy of this community ranges from 6 to 8m in height and is co-dominated by Brigalow and Belah with the occasional occurrence of Coolabah. The sub-canopy exhibits a co-dominant composition of Red Bauhinia and Yellow Wood to a height of 6m.

The shrub layer occurs to a height of 4 m and is dominated by Currant Bush. Associated species include False Sandalwood and Holly Bush, while occasional species include Erythroxylum and Wilga.

Groundcover

The ground layer occurs to a height of 1.5m and is dominated by exotic Buffel Grass, while Awnless Barnyard Grass exhibits a sub-dominant presence. Occasional native species present within this community include Black Speargrass and *Senna sophora* var. (40Mile Scrub J.R.Clarkson+ 6908).

A list of the dominant flora species of Community 5 is provided in Table 35.



Photo Plate 5 Community 5 – Brigalow (*A. harpophylla*) / Belah (*C. cristata*) Low Open Woodland

Table 35 Dominant Flora of Community 5 – Brigalow (*A. harpophylla*) / Belah (*C. cristata*) Low Open Woodland

Layer	Relative Dominance	Scientific Name	Common Name
T1 (6 – 8 m)	Co-dominant	<i>Acacia harpophylla</i>	Brigalow
	Co-dominant	<i>Casuarina cristata</i>	Belah
	Occasional	<i>Eucalyptus coolabah</i>	Coolabah
T2 (4 – 6 m)	Co-dominant	<i>Lysiphyllum cunninghamii</i>	Bauhinia
	Co-dominant	<i>Terminalia oblongata</i> subsp. <i>oblongata</i>	Yellow Wood
Shrub (1.5 – 4 m)	Dominant	<i>Carissa ovata</i>	Currant Bush
	Associated	<i>Alectryon diversifolius</i>	Holly Bush
	Associated	<i>Eremophila mitchellii</i>	False Sandalwood
	Occasional	<i>Geijera parviflora</i>	Wilga

Layer	Relative Dominance	Scientific Name	Common Name
	Occasional	<i>Erythroxylum australe</i>	Erythroxylum
Ground (0 – 1.5 m)	Dominant	<i>Cenchrus ciliaris</i> *	Buffel Grass
	Associated	<i>Echinochloa colona</i> *	Awnless Barnyard Grass
	Occasional	<i>Senna sophora</i> var. (40Mile Scrub J.R.Clarkson+ 6908)	-
	Occasional	<i>Heteropogon contortus</i>	Black Speargrass

* introduced species

Conservation Status

Community 5 is consistent with RE 11.4.9 – “*Acacia harpophylla* shrubby open forest to woodland with *Terminalia oblongata* on Cainozoic clay plains”, with regards to species composition. However, this community consists of open woodland regrowth vegetation with a canopy height to 8 m, which does not satisfy the requirement for >70% of the height and >50% of the cover relative to the undisturbed height and cover of RE 11.4.9. Although RE 11.4.9 is listed as “Endangered” under the VM Act and EHP Biodiversity Status, this particular community is non-remnant and is therefore not of conservation significance under Queensland legislation.

This community is listed under the EPBC Act, described as “Brigalow (*Acacia harpophylla* dominant and co-dominant)”.

Despite targeted searches, no flora species of conservation significance were recorded from this community.

6.4.1.6 Community 6 – Silver-leaved Ironbark Open Woodland (RE 11.3.6)

Location

This Silver-leaved Ironbark Open Woodland community (Photo Plate 6) occurs in the north-east portion of the Project site in association with one of the more prominent tributaries to Retreat Creek.

Community Description

Woody Species

This community is best described as open woodland dominated by Silver-leaved Ironbark with associated species including Dallachy’s Gum and Forest Red Gum (*E. tereticornis*) to a height of 17 m. This community contains a T2 layer to 10 m that is dominated by River Teatree. The T2 layer consists of a sub-dominant abundance of White Cypress Pine (*Callitris glaucophylla*) and occasional specimens of Queensland Ebony. The shrub layer is co-dominated by Soap Bush (*Acacia holosericea*) and Currant Bush and complimented by occasional specimens of Red Ash, Erythroxylum and *Senna sophora* var. (40Mile Scrub J.R.Clarkson+ 6908). Woody stem counts completed within this community recorded 14 shrub stems and 4 tree stems within a representative secondary transect.



Groundcover

The ground layer is co-dominated by Red Natal Grass and *Panicum decompositum* var. *tenuous*. Associated grasses include Black Speargrass and two exotic species known as Awnless Barnyard Grass and Buffel Grass. Other occasional groundcover species include Many-flowered Mat-rush (*Lomandra multiflora*), Wild Jute (*Corchorus trilocularis*) and *Aristida lazaridis*. A secondary transect within this community consisted of 82% grass cover, 4% leaf litter and 16% cover of regenerating shrub species.

Table 36 below provides a list of the prominent flora species that comprise community 6.



Photo Plate 6 Community 6 – Silver-leaved Ironbark Open Woodland (RE 11.3.6)

Table 36 Dominant Species of Community 6 – Silver-leaved Ironbark (*E. melanophloia*) Open Woodland

Layer	Relative Dominance	Scientific Name	Common Name
Canopy – T1 (11 – 17 m)	Dominant	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark
	Associated	<i>Corymbia dallachiana</i>	Dallachy's Gum
	Associated	<i>Eucalyptus tereticornis</i>	Forest Red Gum
Canopy – T2 (8 – 10 m)	Dominant	<i>Melaleuca bracteata</i>	River Teatree
	Associated	<i>Callitris glaucophylla</i>	White Cypress Pine
	Occasional	<i>Lysiphyllum hookeri</i>	Queensland Ebony
Shrub	Dominant	<i>Acacia holosericea</i>	Soap Bush
	Dominant	<i>Carissa ovata</i>	Currant Bush

Layer	Relative Dominance	Scientific Name	Common Name
(1.5 – 6 m)	Occasional	<i>Senna sophora</i> var. (40Mile Scrub J.R.Clarkson+ 6908)	-
	Occasional	<i>Erythroxylum australe</i>	Erythroxylum
	Occasional	<i>Alphitonia excelsa</i>	Red Ash
Ground (0 – 1 m)	Co-dominant	<i>Melinis repens</i> *	Red Natal Grass
	Co-dominant	<i>Panicum decompositum</i> var. <i>tenuius</i>	-
	Associated	<i>Echinochloa colona</i> *	Awnless Barnyard Grass
	Associated	<i>Heteropogon contortus</i>	Black Speargrass
	Associated	<i>Cenchrus ciliaris</i> *	Buffel Grass
	Occasional	<i>Lomandra multiflora</i>	Many-flowered Mat-rush
	Occasional	<i>Corchorus trilocularis</i>	Wild Jute
	Occasional	<i>Aristida lazardis</i>	-

* introduced species

Conservation Status

In terms of species composition, this community is considered to be consistent with RE 11.3.6 – “*Eucalyptus melanophloia* woodland on alluvial plains”, as described by the REDD (Queensland Herbarium 2011). RE 11.3.6 is listed as “Least Concern” under the VM Act and “Of Concern” by the EHP Biodiversity Status.

This community is not listed under the federal EPBC Act. No species of conservation significance were recorded from this community.

6.4.2 Plants of Conservation Significance

No plants species listed under either the NC Act or EPBC Act were identified during the course of the survey. A complete list of plant species identified from riparian and aquatic sites during the wet and dry season surveys is provided in Appendix C.

6.4.3 Introduced/weed species

Numerous introduced plant species were recorded from riparian habitats on the Project site. These are listed below in Table 37. The Department of Agriculture, Fisheries and Forestry (DAFF) website was searched for the status of each introduced species against the declared species list and Weed of National Significance (WONS) list.

Under the LP Act, pest species can be listed as Class 1, 2, or 3 declared plants. Class 1 pest species are those that are not commonly present in Queensland, and, if introduced, would cause an adverse



economic, environmental, or social impact. Land owners must take reasonable steps to keep land free of Class 1 pests. Class 2 pest species are established in Queensland and have, or could have, an adverse economic, environmental, or social impact. Land owners must take reasonable steps to keep land free of Class 2 pests, and often a coordinated approach by land owners, local government, and the community is required. Class 3 pest species are those that are established in Queensland and have, or could have, an adverse economic, environmental, or social impact. The primary objective of the Class 3 listing is to prevent the sale of the species, and therefore, prevent their spread into new areas. Landholders are not required to keep land free of Class 3 pests, unless their land is adjacent to an environmentally significant area.

Table 37 Introduced Species of the Project Site

Family	Species Name	Common Name	WONS	Status under the LP Act
Aizoaceae	<i>Trianthema portulacastrum</i>	Black Pigweed	-	-
Apiaceae	<i>Cyclospermum leptophyllum</i>	Slender Celery	-	-
Apocynaceae	<i>Asclepias curassavica</i>	Red-head Cottonbush	-	-
Asteraceae	<i>Bidens pilosa</i>	Cobbler's Pegs	-	-
Asteraceae	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	-	-
Asteraceae	<i>Parthenium hysterophorus</i>	Parthenium	WONS	Class 2
Asteraceae	<i>Senecio madagascariensis</i>	Fireweed	WONS	Class 2
Asteraceae	<i>Silybum marianum</i>	Variegated Thistle	-	-
Asteraceae	<i>Verbesina encelioides</i>	Crown Beard	-	-
Asteraceae	<i>Xanthium pungens</i>	Noogoora Burr	-	-
Caesalpiniaceae	<i>Parkinsonia aculeata</i>	Parkinsonia	WONS	Class 2
Chenopodiaceae	<i>Salsola kali</i>	Roly-poly	-	-
Cyperaceae	<i>Cyperus rotundus</i>	Nutgrass	-	-
Euphorbiaceae	<i>Ricinus communis</i>	Castor Oil Plant	-	-
Fabaceae	<i>Stylosanthes viscosa</i>	Sticky Stylo	-	-
Malvaceae	<i>Malvastrum americanum</i> var. <i>americanum</i>	Spiked Malvastrum	-	-
Malvaceae	<i>Modiola caroliniana</i>	Red-flowered Mallow	-	-
Malvaceae	<i>Sida rhombifolia</i>	Paddy's Lucerne	-	-

Family	Species Name	Common Name	WONS	Status under the LP Act
Malvaceae	<i>Sida spinosa</i>		-	-
Mimosaceae	<i>Acacia farnesiana</i>	Mimosa	-	-
Poaceae	<i>Cenchrus ciliaris</i>	Buffel Grass	-	-
Poaceae	<i>Chloris gayana</i>	Rhodes Grass	-	-
Poaceae	<i>Chloris inflata</i>	Purpletop Rhodes Grass	-	-
Poaceae	<i>Chloris virgata</i>	Feathertop Rhodes Grass	-	-
Poaceae	<i>Dichanthium aristatum</i>	Angleton Grass	-	-
Poaceae	<i>Digitaria ciliaris</i>	Summer Grass	-	-
Poaceae	<i>Echinochloa colona</i>	Awnless Barnyard Grass	-	-
Poaceae	<i>Melinis repens</i>	Red Natal Grass	-	-
Poaceae	<i>Moorochloa eruciformis</i>	Sweet Signal Grass	-	-
Poaceae	<i>Paspalum distichum</i>	Water Couch	-	-
Poaceae	<i>Sorghum X alnum</i>	Sorghum	-	-
Poaceae	<i>Sorghum halepense</i>	Johnson Grass	-	-
Poaceae	<i>Urochloa mosambicensis</i>	Sabi Grass	-	-
Verbenaceae	<i>Lantana camara</i>	Lantana	WONS	Class 3

Introduced species not listed as WONS or declared pest plants as defined under the LP Act.

Pest Fact Sheets sourced from the DAFF website are provided in Appendix F for Parthenium, Fireweed, Parkinsonia and Lantana. These sheets are designed to provide land owners with additional information for each species, including management strategies.

Parthenium (*Parthenium hysterophorus*) was noted in many areas of the Project site. Parthenium is a weed of major concern and is listed as a Class 2 declared weed.

6.5 MACRO-INVERTEBRATES

Aquatic studies have found that particular macro-invertebrate families are highly correlated and sensitive to stream health (Chessman, Growns and Kotlash 1997; Chessman 2003). Consequently, the presence or absence of macro-invertebrate families can be used to determine ecosystem function.



They reflect levels of water temperature, turbidity, electrical conductivity, alkalinity, pH, dissolved oxygen, total nitrogen, total phosphorus and other pollutants.

Identified families are assigned a sensitivity score as described in Chessman (2003). These scores, which range between 1 and 10, reflect the sensitivity of family members to adverse aquatic conditions. Sites with numerous families of high sensitivity scores are interpreted as having better water quality than those with only families of low sensitivity scores.

The SIGNAL 2 score method is commonly used to assess the health of a river by looking at the taxonomic composition of the macro-invertebrate assemblage. The SIGNAL 2 Index value is calculated by averaging the pollution sensitivity grade numbers of the macro-invertebrate families present at each site, and plotting it against the number of families.

Whilst on the surface the pools and waterholes in a stream appear isolated, in reality they are closely and intricately connected through the saturated sediments below and beyond the banks of the stream. This zone is called the hyporheic zone and the animals living in it are called hyporheos. This sub-surface zone is critical for the survival of many macroinvertebrates during the dry season and for the maintenance of water quality. Aquatic macroinvertebrates exhibit a range of strategies for surviving the dry period in temporary streams including mobile adult stages, desiccation resistant eggs or larval stages, burrowing and hibernating, utilising moist leaf litter, and of course surviving in the last remaining permanent water-holes and pools until the next major rainfall event. The sub-surface zone is a region of dynamic exchange of water and materials between the groundwater, under bank aquifers and the river flowing above. When the river stops flowing, the sub-surface zone provides a constant and critical habitat for a variety of truly stream, rather than subterranean, organisms. Moreover, their total numbers may be very high and this zone can be a major source of recruitment after floods and droughts.

A total of 47 macro-invertebrate taxa were identified during the wet season and dry season surveys. The complete list of the macro-invertebrate taxa identified during these surveys is presented in Appendix G. Some of the more commonly encountered macro-invertebrates included True Fly (Diptera: Tanypodinae), Backswimmers (Hemiptera: notonectidae), Water Boatmen (Hemiptera: Corixidae), and Diving Beetles (Coleoptera: Dytiscidae). These four families together accounted for approximately 43% of all specimens identified during the dry season survey. Hemiptera: Corixidae were the most commonly encountered taxa, with specimens recorded from twelve of the sixteen aquatic sites where macro-invertebrate sampling was conducted.

Of the taxa identified during the aquatic surveys, 40 were used to compute a SIGNAL 2 Score for each sampling site (Figure 12). Seven of the identified macro-invertebrate taxa have not been assigned a sensitivity grade number and as such cannot be included in the SIGNAL 2 analysis.

Figure 12 shows the result of the SIGNAL 2 assessment of macro-invertebrate assemblages within and surrounding the Project site during the wet and dry season surveys. The four quadrants represent the following:

- Quadrant 1 – Indicates favourable habitat or chemically dilute water;
- Quadrant 2 – Often indicates high salinity or nutrient levels (may be natural);
- Quadrant 3 – Often indicates toxic pollution or harsh physical environments (or inadequate sampling); and
- Quadrant 4 – Usually indicates urban, industrial, or agricultural pollution.

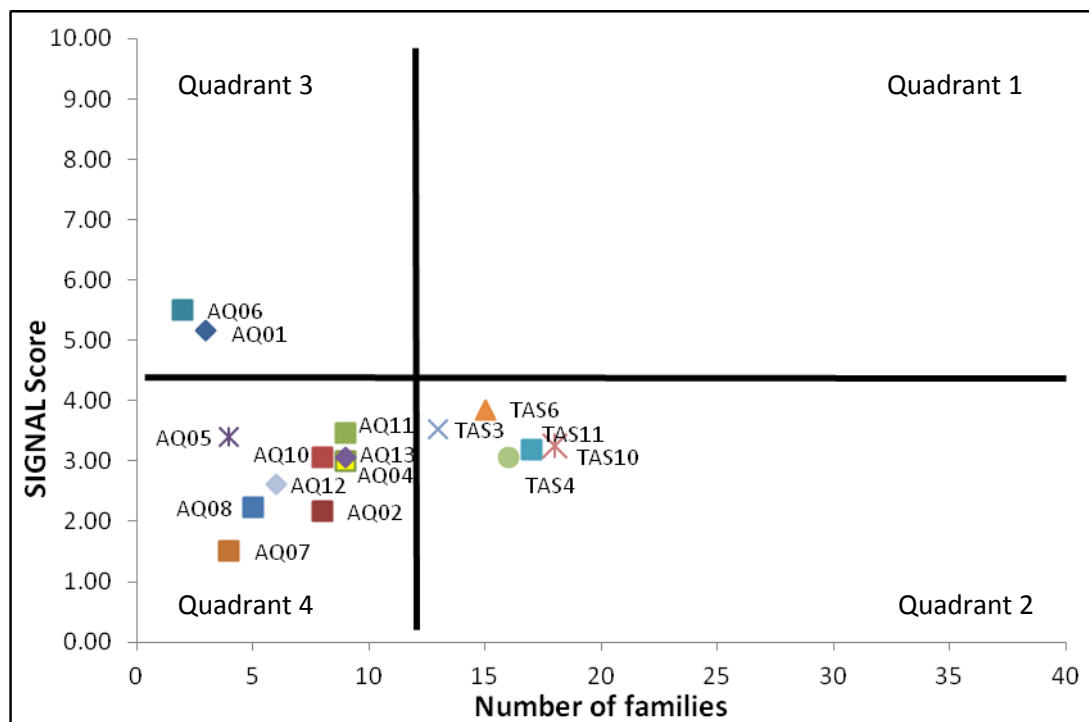


Figure 12 SIGNAL 2 Score

There is a distinct difference in SIGNAL scores when comparing the results from the dry season and wet season sampling sites. As shown in Figure 12, all dry season sampling sites fell within Quadrant 2, while the majority of sites sampled during the wet season fell within Quadrant 4.

There are numerous factors that affect the distribution and density of macro-invertebrates. The variation in SIGNAL scores may be due to climatic conditions prior to surveys. The wet season survey was conducted immediately following a month of substantial rainfall (93.8 mm) when the watercourses were relatively fast flowing. A study conducted by Fritz and Dodds (2005) showed that a greater than 50 year flood can reduce site richness by up to 97% immediately following the flood event, effectively demonstrating that flooding in intermittent streams is an important factor in macro-invertebrate density and richness. As recruitment by aquatic invertebrates can be slow, it is possible that few species had a chance to build up sufficient numbers for detection following wet season rainfall events. The dry season survey was conducted during a period of little rainfall (i.e. 1 mm in the two months prior). This may have been sufficient time for less common species to become detectable.

It is likely that several years' worth of background data will be required before the natural fluctuations are adequately understood. Understanding natural fluctuations is a priority as any changes in the SIGNAL score must be considered in light of these natural changes.

It is generally accepted that three orders of macro-invertebrates, the Ephemeroptera (mayflies), Plecoptera (stoneflies), and Trichoptera (caddisflies) (EPT) are most sensitive to disturbance (Marshall et al, 2001). The total number of families of these groups occurring at sites can be used to assess degradation of habitat and water quality. The use of EPT analysis is limited to regional comparisons, as the comparison of fauna varies between regions and larger river systems. Figure 13 shows that Ephemeroptera and Trichoptera taxa were identified at the majority of the survey sites where macro-invertebrate dip-netting was conducted. No taxa belonging to the Plecoptera order were identified at any of the sites. Trichopteran individuals were more commonly encountered during the dry season survey.

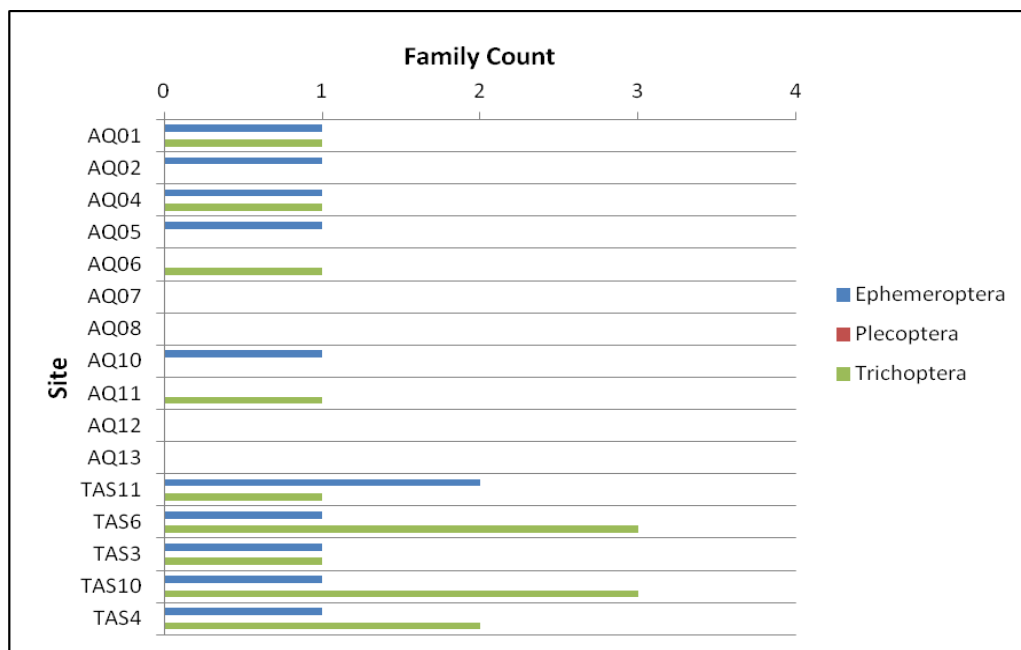


Figure 13 EPT Richness

Crustacean species encountered during the field surveys include shrimp (*Paratya* sp.), Yabbi (*Cherax destructor*) and Freshwater Crab (*Austrothelphusa transversa*). The Freshwater Crab (*Holthuisana* sp.) was encountered in high abundance whilst trapping within the Project site during the wet season. Freshwater crabs were recorded from three of the four sampling sites (i.e. AQ01, AQ02 and AQ07) where trapping was conducted. This species is not included in the SIGNAL scoring. The freshwater crabs were recorded from the larger, swift-flowing, sandy and/or rocky aquatic sites. It must be noted that as this study did not involve a mark-recapture element, there is a possibility that individuals were captured more than once throughout the survey.

6.6 AQUATIC VERTEBRATES

A total of 6 fish, 5 amphibian, 6 reptile, 33 bird and 10 mammal species were recorded in association with the riparian communities. Each vertebrate group is discussed below.

6.6.1 Fish

Ephemeral streams are subject to wide physico-chemical fluctuations. This is reflected in the species composition of fish found in these types of waterways, and notably their tolerance to a wide range of water physico-chemical qualities (McNeil, 2005).

Six fish species were detected within the Project site during the field surveys. The most commonly recorded fish species was Spangled Perch (*Leiopotherapon unicolour*), closely followed by Southern Purple-spotted Gudgeon (*Mogurnda adspersa*) and Agassiz's Glassfish (*Ambassis agassizii*). Less commonly recorded species include Bony Bream (*Nematalosa erebi*), Eastern Rainbowfish (*Melanotaenia splendida*) and Fly-specked Hardyhead (*Craterocephalus stercusmuscarum*). All of these species are native and occur commonly in rivers and creeks throughout central-eastern Queensland. A list of fish species recorded at each sampling site is provided in Appendix H.

The Spangled Perch is widely distributed throughout Australia, specifically the northern half of Australia, occurring in a range of habitats including ephemeral streams and tributaries. This species often inhabits areas with substrates consisting primarily of mud, sand and fine gravel. The Spangled

Perch is known to rapidly disperse upstream following rain events into recently inundated areas and connected waterholes. This species is capable of tolerating a wide range of environmental conditions, readily persisting in extremes of water quality. The Spangled Perch is not listed as a species of conservational significance in Queensland or Australia.

The Southern Purple-spotted Gudgeon is common throughout New South Wales, Victoria and southern and eastern Queensland, occupying drainages of the east coast from Clarence River in NSW to central Cape York Peninsula in Queensland. This species occupies rivers, creeks and billabongs, usually in slow-flowing sections over rocks or among vegetation (Allen *et al.* 2002). Suitable habitat for this species consists of slow flowing waters containing aquatic weeds and suitable hard objects that support spawning activities (NFA 2011). The Southern Purple-spotted Gudgeon is a bottom dweller that rarely swims continuously, tending to cover long distances in a series of jerky darts (NFA 2011). The Southern Purple-spotted Gudgeon is not considered threatened under Queensland or Commonwealth legislation.



Photo Plate 7 Southern Purple-spotted Gudgeon (*Mogurnda adpersa*)

The Agassiz's Glassfish occurs throughout the Murray-Darling system, in coastal drainages of New South Wales and Queensland. This species is found to occur in still or slow-flowing parts of lowland rivers, upland rivers and streams as well as small coastal streams (Pusey *et al.* 2004). It is also known to occur in lakes, ponds, drainage ditches and swamps (Pusey *et al.* 2004; Allen *et al.* 2002). Although the species occupies streams of all sizes, it occurs more commonly in larger streams with a low to moderate cover of riparian vegetation (Pusey *et al.* 2004). Agassiz's Glassfish is most abundant in habitats containing aquatic vegetation and fine substrates comprised of sand, fine gravel and coarse gravel (Pusey *et al.* 2004). This species is not considered threatened under Queensland or Commonwealth legislation.

The Bony Bream is one of Australia's most widespread native freshwater fishes, with a distribution spreading from the Kimberley Region in Western Australia, throughout most of the Northern Territory and Queensland, the arid regions of South Australia as well as the Murray-Darling basin in New South Wales and Victoria (Pusey *et al.* 2004). The species is known to occur in a variety of habitats including salt lakes, lowland rivers, floodplain billabongs, lagoons and impoundments to rainforest streams, but most commonly in the shallows of still or slow-flowing streams and rivers, particularly in turbid

conditions (Pusey *et al.* 2004). The Bony Bream is not listed as a species of conservation significance in Queensland or Australia.

The Eastern Rainbowfish (*Melanotaenia splendida*) is common throughout the ephemeral waterways of north-west Queensland and is widely distributed along the central and northern Queensland coasts and drainages of the Northern Territory and Cape York that flow into the Gulf of Carpentaria. Within this distribution, the Eastern Rainbowfish is generally observed in high numbers occupying the shallower margins of still water habitats. Similar to other species observed in the present assessment, this species can tolerate a broad range of environmental conditions including temperature, pH, turbidity and conductivity. This species is known to actively move upstream during periods of high flow recolonising recently inundated habitats (Pusey *et al.* 2004). The eastern Rainbowfish (*Melanotaenia splendida*) is not considered threatened under Queensland and Commonwealth legislation.

The Fly-specked Hardyhead has a very widespread distribution extending throughout the coastal and inland drainages of eastern and northern Australia (Pusey *et al.* 2004). Suitable habitats for this species include fast-flowing creeks, still or slow-moving sections of rivers, small creeks, lakes, ponds, reservoirs, and brackish river estuaries. The Fly-specked Hardyhead generally occurs in shallow water among aquatic vegetation with substrates comprised of sand, gravel or mud (Allen *et al.* 2002). This species is not considered threatened under Queensland and Commonwealth legislation.

A review of the water quality results obtained within the Project site revealed that all recorded fish species exhibit physio-chemical tolerances (refer to Table 38) within the recorded ranges for pH and thermal tolerance.

Table 38 Expected Water Quality Tolerances of the Identified Fish Species

Species	pH Tolerance	Thermal Tolerance (°C)
Range during the surveys	6.94 – 9.62	20.3 – 31.8
Spangled Perch	4 – 10.2 ¹	5.0 – 44.0 ¹
Bony Bream	4.8 – 8.6 ¹	9.0 – 38.0 ¹
Agassiz's Glassfish	0.0 – 7.6 ³	15.0 – 25.0 ³
Eastern Rainbowfish	5 – 9.2 ²	12.0 – 36.0 ²
Southern Purple-spotted Gudgeon	5.5 – 8.4 ³	16.7 – 27.0 ³
Fly-specked Hardyhead	5.5 – 9.2 ³	20.0 – 35.0 ³

¹ = obtained from Allen *et al.* (2002)

² = obtained from Tappin (2009)

³ = obtained from ANGFA (2009)

Sampling of fauna was not undertaken at sites where water availability, and therefore aquatic condition, was deemed unsuitable. Drag netting was conducted at four locations (TAS 3, TAS 4, TAS 6 and TAS 11) during the dry season. The depth at all other sampling sites was insufficient to facilitate drag netting during this survey period. Those sites that held sufficient water during the wet season

were considered to have too great a depth, width and velocity of water and could not be sampled from the water's edge.

6.6.2 Birds

During the course of the aquatic surveys, 33 bird species with habitat requirements linked to aquatic areas were observed within the Project site. A further 23 terrestrial bird species were recorded from the aquatic sampling sites but have been omitted from the following analyses due to their broad, non-aquatic habitat requirements. The full list of aquatic and terrestrial bird species is provided in Appendix H.

The most commonly observed aquatic or riparian bird species were the Black Swan (*Cygnus atratus*), Sulphur-crested Cockatoo (*Cacatua galerita*) and the Brolga (*Grus rubicund*). The large dam or artificial wetland (aquatic sites TAS 3 and AQ12) located in the central portion of the site was found to support the highest diversity of aquatic birds during both the dry season and wet season surveys. Aquatic site TAS 3 was located in the north-east of the large dam and was fringed by *Melaleuca bracteata*, *Eucalyptus melanophloia* and *Eucalyptus cambageana* with floating and emergent macrophytes. Sampling site AQ12 also occurs in association with the large dam. This portion of the dam was fringed by a low tree layer of *Acacia harpophylla* and an understorey dominated by exotic plant species such as Parthenium and Parkinsonia. One emergent flora species, *Persicaria attenuata* subsp. *attenuata* was present at this site. Both sites provide suitable habitat for a high diversity of wetland indicator bird species.

Of the suite of bird species identified within the Project site, three species – the Cattle Egret (*Ardea ibis*), Latham's Snipe (*Gallinago hardwickii*) and Glossy Ibis (*Plegadis falcinellus*) – are listed as Migratory and Marine under the EPBC Act. None are listed as Rare or Threatened under the NC Act.

Each of these species has a widespread distribution throughout eastern Queensland, and the local populations on the Project site are unlikely to constitute an 'ecologically significant proportion' of the total population of these species.

Furthermore, the Project site does not occur at the limit of any of these species' ranges, nor are any of these species considered to be declining within the region. Therefore, it is unlikely the Project will have a significant impact on the regional populations of the Cattle Egret, Latham's Snipe or Glossy Ibis.

6.6.3 Mammals

Ten species of microbat were positively recorded from the Project site using an ANABAT detector. A list of microbat species recorded from the Project site is provided in Appendix H. One species of conservation significance, the Little Pied Bat (*Chalinolobus picatus*), was positively identified during the dry season survey. The Little Pied Bat was also 'possibly recorded' at sampling site AQ11 during the wet season survey. This species produces a call that can be confused with *Vespadelus baverstocki* and *Scotorepens* spp., although calls were most like *Chalinolobus picatus* with low chance of confusion with other species. This species is listed as Near Threatened under the NC Act, and known to occur in the broader region.

Troughton's Sheath-tail Bat (*Taphozous troughtoni*) was also 'possibly recorded' at AQ11 during the wet season survey. This species is not listed as a species of conservation significance under the NC Act, or the EPBC Act. Calls from this species fall within the same frequency as *Mormopterus beccarii* and identification is difficult. Due to a high chance of confusion with other species and the limited distribution of this species to north-western QLD (Churchill, 1998), it is highly unlikely that this species inhabits the Project site.



6.6.4 Amphibians

Many amphibian species that occur in Australia's drier regions are burrowing species capable of spending several years underground awaiting heavy rain, after which they come to the soil surface to feed and breed. This behaviour is referred to as aestivation and assists in water preservation and survival during prolonged drought (Withers, 1995). Consequently, the vast majority of amphibians from seasonally dry regions only occur in areas where the ground is soft enough to allow digging during wet periods.

Non-burrowing frog species also inhabit drier regions where they adopt different survival strategies, such as sheltering deep in tree hollows or cool rock crevices. However, these species are still typically associated with water sources.

Five amphibian species were recorded from the Project site during the aquatic surveys. These included the Spotted Grassfrog (*Limnodynastes tasmaniensis*), Green Tree Frog (*Litoria caerulea*), Person's Tree Frog (*Litoria peronii*), Greenstripe Frog (*Cyclorana alboguttata*) and Cane Toad (*Rhinella marina*).

The Cane Toad is a non-declared pest animal under the LP Act, so there is no legal requirement to control their numbers within the Project site. However, they can cause serious environmental harm, and it is recommended that the Project take steps to minimise their population growth. This species was introduced to Australia in 1935 to control agricultural pests, but proved ineffective. They produce highly toxic venom, which can cause death if ingested by domestic and most native animals (DEEDI, 2009). They are voracious feeders, and will eat a wide variety of insects, frogs, small reptiles, mammals, and birds (DEEDI, 2009). A Pest Fact Sheet for the species is provided in Appendix F.

6.6.5 Reptiles

Two aquatic reptile species, the Keelback (*Tropidonophis mairii*) and Eastern Snake-necked Turtle (*Chelodina longicollis*) were recorded during aquatic surveys of the Project site. An additional four reptile species were observed in association with riparian communities on the Project site. These species were the Brown Tree Snake (*Boiga irregularis*), Dubious Dtella (*Gehyra dubia*), Open Litter Rainbow Skink (*Carlia pectoralis*), and a gecko (*Gekkonidae* sp.) that could not be identified to species level.

6.6.6 Aquatic Vertebrate Species of Conservation Significance

One mammal species of conservation significance, the Little Pied Bat (*Chalinolobus picatus*), was recorded on the Project site. The Little Pied Bat is known to occupy woodlands where they forage for insects among the canopy. They roost primarily in stags, tree hollows and occasionally in caves. This species is not considered to be dependent on aquatic or riparian environments within the Project site, but is likely to utilise the vast woodland habitats contained in the adjoining Fairbairn State Forest. No other aquatic vertebrates of conservation significance were recorded at the time of the surveys.

Aquatic and riparian species of conservation significance that are known from the broad region but were not observed on the Project site by AARC are further detailed below. These species have been identified from wildlife database searches and scientific literature searches. Table 39 provides an assessment of the likelihood of these species utilising the Project site.

Table 39 Species of Conservation Significance from the Region Not Identified within the Project Site

Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
Birds				
<i>Anseranas semipalmata</i> Magpie Goose	Marine	Not Listed	The magpie goose occupies large seasonal wetlands and well vegetated dams with rushes and sedges; wet grasslands and floodplains (Pizzey & Knight 2006).	Suitable habitat for this species occurs on the Project site. However, the Project site does not occur at the edge of the species distributional range and the area is not known to be a significant foraging or breeding ground.
<i>Apus pacificus</i> Fork-tailed Swift	Migratory/Marine	Not Listed	A non-breeding visitor to all states and territories of Australia (Higgins 1999). Possible tendency to move toward arid areas, also moves over the coast and urban areas (Simpson & Day 2010)	The Project site is not known to provide a significant foraging or breeding ground and does not occur at the limit of the species distribution. Due to the abundance of similar habitat type within the area, the Project is unlikely to impact on the species.
<i>Ardea alba</i> Great Egret, White Egret	Migratory/Marine	Not Listed	Great Egrets occur throughout most of the world. They are common throughout Australia, with the exception of the most arid areas. Inhabits floodwaters, rivers, shallows of wetlands, intertidal mudflats (Simpson & Day 2010)	The Lacustrine wetland provides suitable habitat on the Project site. However, habitats associated with major watercourses in the region (i.e. Nogoa River and Lake Maraboon) potentially provide more suitable habitat for this species.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Ardea ibis</i> Cattle Egret	Migratory/Marine	Not Listed	Inhabits stock paddocks, pastures, croplands, garbage tips, mudflats and drains (Pizzey & Knight 2006)	The Project site provides habitat areas deemed suitable for this species. Given the abundance of similar habitat type within the area, the Project is unlikely to impact on the species.
<i>Ephippiorhynchus asiaticus</i> Black-necked Stork	Not Listed	Near Threatened	Prefers open freshwater environments, including the margins of swamps, shallow floodwaters over grasslands, wet shorelines, margins of mangroves, mudflats and estuaries (Morcombe 2002).	Suitable habitat for this species occurs in the north of the Project site. Given the abundance of Palustrine systems in the region, there is a significant amount of suitable habitat available to this species and as such, the Project disturbance is expected to have minimal impact on the species.
<i>Erythrotriorchis radiatus</i> Red Goshawk	Vulnerable	Endangered	Found over wooded and forested land with a mosaic of vegetation types in tropical and warm temperate climates in coastal and sub coastal areas (Marchant and Higgins 1993).	This species is known to occur near permanent water. While Retreat Creek and Taraborah Creek offer limited areas of suitable habitat in terms of both water and vegetation, any impacts on these creeks may have immediate impacts on habitat availability on site, but are not expected to have any adverse effects on the species.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Gallinago hardwickii</i> Latham's Snipe	Migratory/Marine	Not Listed	This species occurs in association with areas of soft wet ground or shallow water with tussocks, seepage areas below dams, irrigated areas, scrub or open woodland from sea level to alpine bogs over 2,000 m, saltmarshes and mangrove fringes (Pizzey & Knight 2006).	For the most part, any areas of suitable habitat for this species within the Project site will be retained despite the construction and operation of the Project. Suitable habitat is also abundant throughout the region and as such, the Project is not likely to impact on the species.
<i>Geophaps scripta scripta</i> Squatter Pigeon (southern)	Vulnerable	Vulnerable	This species occurs in dry grassy eucalypt woodlands and open forests, mostly in sandy sites near permanent water (Curtis et al. 2012)	The Project site lacks any permanent watercourses required to support a population in the long-term. The Project site may provide suitable habitat for this species.
<i>Haliaeetus leucogaster</i> White-bellied Sea-Eagle	Migratory/Marine	Not Listed	Usually coastal, the White-bellied Sea-Eagle will seasonally occur along flooded inland swamps and major rivers (Morcombe 2002)	The watercourses within the Project site are ephemeral and semi-permanent in nature and as such it is unlikely the species would occur within the Project Site.
<i>Hirundapus caudacutus</i> White-throated Needletail	Migratory/Marine	Not Listed	This species occupies airspace over forests, woodlands, farmlands, plains, lakes, coasts, hilltops and timbered ranges (Pizzey & Knight 2006).	The Project site provides limited habitat for this species. It is more likely that this species occurs over the vast woodland habitats and the major wetland (i.e. Lake Maraboon) located to the south-east of the Project site.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Melithreptus gularis</i> Black Chinned Honey Eater	Not Listed	Near Threatened	Often found in the upper levels of open forest and woodland dominated by box and ironbark eucalypts, also in riparian areas (Higgins <i>et al.</i> , 2001)	Some suitable habitat may occur on the Project site however given the species range and the availability of similar habitat in the region it is unlikely the Project will adversely affect this species at a regional scale.
<i>Merops ornatus</i> Rainbow Bee-eater	Migratory/Marine	Not Listed	The rainbow bee-eater occupies open woodlands, sand ridges, sandpits, river banks, road cuttings, beaches, dunes, cliffs, rainforest and golf courses (Pizzey & Knight 2006).	The Project site provides limited habitat for this species. It is highly likely that this species would occupy more suitable habitats in the region such as the banks of the Nogoia River.
<i>Myiagra cyanoleuca</i> Satin Flycatcher	Migratory/Marine	Not Listed	This species tends to inhabit heavily vegetated gullies in forests, taller woodlands. During migration, the satin flycatcher can be found in coastal forests, woodlands, mangroves, gardens and trees in open country (Pizzey & Knight 2006).	No suitable habitat occurs on the Project Site. Although individuals may occur sporadically along densely vegetated watercourses in region, the Project is not likely to impact on the species.
<i>Neochmia ruficauda</i> <i>ruficauda</i> Star Finch (eastern)	Endangered	Endangered	This species occurs in grasslands and grassy woodlands, near permanent water (Curtis <i>et al.</i> 2012).	Suitable habitat occurs in the region. While potential habitat for this species is present, the Project site lacks permanent watercourses. The project is unlikely to impact the species if it does occur in the region.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Nettapus coromandelianus</i> Cotton Pygmy-goose	Migratory/Marine	Not Listed	The cotton pygmy-goose occurs in deeper freshwater swamps, lagoons and dams with waterlilies and other semi-emergent water plants (Pizzey & Knight 2006).	Suitable habitat for this species occurs on the Project site and surrounding lands. Due to the abundance of similar habitat type surrounding the Project Site, if the species was present in the region, the Project is unlikely to impact on the species.
<i>Phaethon rubricauda</i> Red-tailed Tropicbird	Not Listed	Vulnerable	The red-tailed tropicbird shows preference for tropical oceans and largely breeds on islands, including atolls and cays (Curtis et al. 2012). The species occurs on coasts but is rarely found near land except at nesting sites (Pizzey & Knight 2006).	Given the inland location of the Project site it is highly unlikely that the red-tailed tropicbird would occur in the region.
<i>Rostratula australis</i> Australian Painted Snipe	Vulnerable/ Migratory/ Marine	Vulnerable	This species inhabits shallow inland wetlands, either permanent or temporary	Suitable habitat for this species occurs on the Project site. Due to the abundance of similar habitat type surrounding the Project Site, if the species was present in the region, the Project is unlikely to impact on the species.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Rostratula benghalensis s. lat</i> Painted Snipe	Migratory/Marine	Not Listed	Inhabits the surrounds and shallows of wetlands that are well vegetated with low cover (Pizzey & Knight 2006)	The Project site potentially provides suitable habitat for this species. Due to the abundance of similar habitat type surrounding the Project Site, if the species was present in the region, the Project is unlikely to impact on the species
<i>Tadorna radjah</i> Radjah Shelduck	Not Listed	Near Threatened	During the wet season the radjah Shelduck will occupy most shall waters including freshwater, saltwater and brackish swamps, mangrove lined coastal creeks and shallow river margins. During the dry season, the species tends to populate around larger permanent lagoons, paperbark swamps, man-made wetlands, mangroves, tidal flats and estuaries (Pizzey & Knight 2006).	Although suitable habitat for this species occurs on the Project site, the site occurs beyond the limit of the species distribution and it is therefore considered unlikely that this species occurs on the Project site.
Reptiles				
<i>Denisonia maculata</i> Ornamental Snake	Vulnerable	Vulnerable	This species' preferred habitat is within, or close to woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Land Zone 4, but also lake margins and wetlands (Wilson & Knowles 1988).	The Project site provides suitable habitat for this species. However, given the presence of Lake Maraboon and associated woodlands to the south-east of the Project site, it is highly likely that this species would prefer these habitats. In the event that the species does occur in the region, it is unlikely that the project would impact on the species.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
<i>Hemiaspis damelii</i> Grey Snake	Not Listed	Endangered	This species shows preference for cracking flood-prone soils in the Brigalow Belt, extending to Lockyer Valley in Southeast Queensland and the north-east interior of NSW. It shelters in soil cavities and beneath well-insulated debris (Wilson 2005).	Suitable habitat for this species occurs on the Project site. Due to the abundance of similar habitat type surrounding the Project Site, if the species was present in the region, the Project is unlikely to impact on the species.
<i>Rheodytes leukops</i> Fitzroy River Turtle	Vulnerable	Vulnerable	This species is found in rivers within the Fitzroy Catchment with large deep pools with rocky, gravelly or sandy substrates, connected by shallow riffles. Preferred areas have high water clarity, and are often associated with Ribbonweed (<i>Vallisneria</i> sp.) beds (Cogger et al. 2000).	Suitable habitat for this species does not occur on the Project site. This species is not considered likely to occur on site.
Amphibians				
<i>Cyclorana verrucosa</i> Rough Collared Frog	Not Listed	Near threatened	The rough-collared frog occurs near seasonal ponds, creeks, and clay pans in open country (Tyler & Knight 2011)	Suitable habitat for this species occurs on the Project site and surrounding lands. Due to the abundance of similar habitat type surrounding the Project Site, if the species was present in the region, the Project is unlikely to impact on the species.



Scientific Name Common Name	Conservation Status		Habitat	Notes / Likelihood of Presence on Site
	EPBC Act	NC Act		
Fish				
<i>Maccullochella peelii</i> Murray Cod	Vulnerable	Not Listed	The Murray cod occupies slow flowing, turbid waters of rivers and streams at low elevations, fast moving, clear rocky upland streams (Allen et al. 2002). The species tends to favour deeper water around boulders, logs, undercut banks and overhanging vegetation.	The Project site may provide suitable habitat for this species during the wet season. However, given the availability of habitat associated with major watercourses in the region such as the Nogoa River, it is likely these habitat areas would be better suited to the species.

6.7 HABITAT ASSESSMENT

By comparing with the table of example interpretations given previously (Table 7), it can be seen that the aquatic environments of the Study Area are of relatively good condition overall. Most sites (TAS1, TAS2, TAS4, TAS5, TAS7 and TAS8) scored between 80 and 99, which can be considered relatively good habitat, generally providing several within-channel habitat types and relatively stable and well-vegetated banks. Three sites (TAS3, TAS10 and TAS11) scored between 101 and 111 and could be considered to offer favourable habitat. Three sites (TAS6, TAS9 and TAS12) scored between 62 and 66 and could be considered to provide moderate habitat quality. Of these, one is a pastoral dam heavily utilised by cattle, another is a 1st order drainage line, and the third is a wetland of standing water. This method of Habitat Assessment does not consider factors such as weed infestation, water quality, plant and animal diversity or water capacity and persistence.

Table 40 below summarises Habitat Assessment scores for each of the survey sites.

Table 40 Habitat Assessment Scores and Descriptions

Site	Score	Description
Dry Season Survey Sites		
TAS1 Retreat Creek (east)	99	TAS1 is located in a River Red Gum riparian woodland community. The dominant vegetation was primarily native and weeds were not a particular problem at this site. There was significant variation in channel habitat, with submerged logs, undercut banks and a range of channel depths. No water was recorded at this site during the dry season survey. Although bank vegetation was dominated by trees, the stability of the watercourse banks was poor.
TAS2 Retreat Creek (west)	80	TAS2 occurs in a river red gum riparian woodland community. <i>Parkinsonia</i> (<i>Parkinsonia aculeata</i>) and Mimosa Bush (<i>Acacia farnesiana</i>) were noted at this site. The variation in channel habitat was fair, with several habitat types and adequate depth in pools and riffles present. No water was recorded at this site during the dry season survey. Bank vegetation consisted predominantly of trees, although bank stability was poor.
TAS3 Large dam or Lacustrine Wetland	107	TAS3 is located on a large dam or lacustrine wetland. Water, including deep water habitats, is present year round. The variation in habitat was excellent, with several velocity/depth categories. Bank vegetation and bank stability was also excellent, as the banks were gently sloping and dominated by tree and shrub cover.
TAS4 Pastoral Dam	86	TAS4 is a small pastoral dam on black clay. Vegetation was primarily consistent with the surrounding non-remnant grasslands but included several aquatic and hydrophilic species fringing the dam. Water is present at this site year round but there is no running water under normal conditions. Bank stability was good, as the bank was gently sloping around most of the perimeter. Bank vegetation was dominated by grasses and sedges.
TAS5 Retreat Creek	85	TAS5 is located within a river red gum riparian woodland community. Weeds were particularly invasive at this site, with the presence of Noogoora Burr (<i>Xanthium pungens</i>) and a high

Site	Score	Description
		abundance of Variegated Thistle (<i>Silybum marianum</i>). Habitat variation was good, with rubble, logs and undercut banks present. Although bank vegetation was dominated by trees, bank stability was poor. Erosion was evident in some places where the steep banks have failed and root exposure has occurred.
TAS6 Pooled drainage line / pastoral dam associated with Retreat Creek	62	TAS6 occurs along a drainage line to Retreat Creek within non-remnant grassland. Although water is present at this site year round, there is no running water under normal conditions. Bank vegetation was dominated by grasses and sedges. Trees, including river red gum grow around part of the perimeter, while Mimosa Bush was well established. Habitat variability was very poor. Bank stability was fair with moderately sloping banks and evidence of erosion occurring close to the water. This site was heavily utilised by stock.
TAS7 Taraborah Creek	97	TAS7 is located within River Teatree riparian woodland where Buffel Grass (<i>Cenchrus ciliaris</i>) occurs as the dominant ground cover species. Habitat variation was good at this site, with several in-stream habitat types present. Water was not present during the dry season survey. Bank stability was good, and evidence of erosion was minor.
TAS8 Ephemeral Palustrine Wetland	82	TAS8 is located within a large, ephemeral palustrine wetland. Habitat variation was low. Erosion and scouring was very low, as this wetland is very flat and shallow, with no defined banks. Vegetation associated with the wetland is dominated by Lignum (<i>Muehlenbeckia florulenta</i>) while grasses and sedges form a dense, short ground layer. Only a small amount of water was present during the dry season survey.
TAS9 Drainage line to Taraborah Creek	62	TAS9 is located within a sandy, 1 st order drainage line to Taraborah Creek. There was little habitat variation. It was apparent that water is not persistent but present only during and immediately after rain events. Bank stability was fair, although erosion of the banks was evident and the bank vegetation consisted primarily of grass.
TAS10 Drainage line to Taraborah Creek	111	TAS10 is located within an unnamed 1 st order stream, a drainage line of Taraborah Creek. The vegetation community consisted of River Teatree riparian woodland. Water was present in pools during the dry season survey. Habitat variation within this creek was excellent, with a variety of in-stream habitat types present and little erosion/scouring of the channel. Bank stability was good, which is most likely a result of the bank vegetation that is dominated by trees.
TAS11 Drainage line to Retreat Creek	101	TAS11 is located within a creek flowing northward towards Retreat Creek. Flowing water was recorded during the dry season survey. This creek is fed by a spring. Habitat variation was excellent, due to the presence of several in-stream habitat types, including pools, runs and riffles. Channel scouring was minimal, however a small amount of bank erosion was observed. Bank stability was good and bank vegetation was dominated by grass.

Site	Score	Description
TAS12 Palustrine Wetland	66	TAS12 is located within a palustrine wetland, apparently fed by overflow from the adjacent large lacustrine wetland (i.e. TAS3). Water was recorded during the dry season survey; however, there was little evidence of flowing water. Habitat variation was poor. Scouring and bank erosion was minimal, with little bank erosion noted. Vegetation was dominated by rushes within the wetlands and grass on the banks.
Wet Season Survey Sites		
AQ1 Retreat Creek	99	AQ1 is located along Retreat Creek, in the north-east corner of the site. This aquatic sampling site provided good aquatic habitat with rubble and gravel and boulders surrounded by little sediment. There was habitat variety with deep riffles and pools and all four habitat types (slow shallow, slow deep, fast deep and fast shallow). Little or no enlargement of islands or point bars and/or channelisation was observed. The banks were moderately unstable with moderate frequency and size of eroded areas. Stream bank surfaces were well vegetated with grasses forming the dominant vegetation type.
AQ2 Retreat Creek	88	AQ2 is located along Retreat Creek, adjacent to the northern boundary of the site. This site was found to provide a good composition of gravel, rubble or other stable habitat with deep pools and riffles present. Some new increase in bar formation, mostly from coarse gravel, was evident. The banks were moderately stable with infrequent, small areas of erosion. Vegetation type along the banks was dominated by grasses.
AQ3 Large dam or Lacustrine Wetland	61	AQ3 occurs as a large dam or lacustrine wetland located in the central region of the site. There was a lack of aquatic habitat with very little rubble or gravel present and only the one velocity type present (pools). Heavy deposits of fine materials were present at the site. The banks were moderately unstable with side slopes up to 60% on some banks and eroded areas of moderate size and frequency. The stream banks were largely covered by vegetation with grasses and sedges forming the dominant vegetation type.
AQ4 Pastoral dam	80	AQ4 occurs on Retreat Creek. The availability of aquatic habitat was less than desirable at this site where there is little rubble or gravel. Some scouring and deposition in pools was evident where grades steepen. The banks were moderately unstable with side slopes up to 60% on some banks with moderate size and frequency of eroded areas. The stream banks were largely covered by vegetation with grasses forming the dominant vegetation type.
AQ5 Retreat Creek	67	AQ5 is located along Retreat Creek in the west of the Project site. There was an obvious lack of aquatic habitat and only three of the four depth/velocity habitat types were present. Occasional riffles or bends and bottom contours provided some habitat. Some scouring and deposition in pools was evident where grades steepen. Less than 50% of the stream bank was covered by vegetation. Grasses form the dominant vegetation type.

Site	Score	Description
AQ6 Pooled drainage line / pastoral dam associated with Retreat Creek	80	AQ6 occurs along a drainage line to Retreat Creek in the west of the Project site. There was an apparent lack of habitat at this site with little rubble or gravel and only the occasional riffle or bend present. The banks were moderately unstable with moderate frequency and size of eroded areas and side slopes up to 60% in some areas. The banks consist of over 80% vegetation cover with grasses forming the dominant vegetation type.
AQ7 Taroborah Creek	83	AQ7 is located on Taroborah Creek in the south-west portion of the Project site. Although adequate depths in pools, riffles and bends provided some habitat, there was a lack of substrate and cover variety at this site. All four habitat types (slow shallow, slow deep, fast deep and fast shallow) were present. The site was found to have moderate levels of deposition on bars and pools partly filled with silt. Bends, deeper pools and riffles provide some habitat at this site. The banks were moderately stable with infrequent and small areas of erosion that were mostly healed over. Greater than 80% of the stream bank surfaces were covered by vegetation with grasses forming the dominant vegetation type.
AQ8 Palustrine wetland	94	AQ8 occurs within a palustrine wetland located in the north-west corner of the site. This site provided good aquatic habitat with a variety of substrate types and elements of cover (e.g. gravel, rubble, submerged logs, undercut banks, etc.). There was little or no sedimentation, deposition or scouring. Stream bank surfaces were well vegetated with grasses forming the dominant vegetation type.
AQ9 Drainage line to Taroborah Creek.	71	AQ9 is located along a drainage line to Taroborah Creek. Habitat availability at this site was less than desirable with little rubble, gravel or other stable habitat and only the occasional bend present. The banks were moderately stable with infrequent small areas of erosion and greater than 80% cover by vegetation. Grasses form the dominant vegetation type.
AQ10 Drainage line to Taroborah Creek	99	AQ10 occurs in the south-west of the project site along a drainage line to Taroborah Creek. This site provided good aquatic habitat with a variety of substrate types and elements of cover (e.g. gravel, rubble, submerged logs, undercut banks, etc.) as well as the occasional riffle or bend. Only three of the four habitat types (slow shallow, slow deep, fast deep and fast shallow) were present. There was little or no sedimentation, deposition or scouring. The banks were stable with no evidence of erosion or bank failure and greater than 80% vegetation cover. Trees form the dominant vegetation type.
AQ11 Drainage line to Retreat Creek	90	AQ11 is located along a drainage line to Retreat Creek in the east of the Project site. This site provided good aquatic habitat with a variety of substrate types and elements of cover (e.g. gravel, rubble, submerged logs, undercut banks, etc.) as well as the occasional riffle or bend. All four habitat types (slow shallow, slow deep, fast deep and fast shallow) were present. Moderate levels of sedimentation and deposition were observed. The banks were stable with no evidence of erosion or bank failure. Greater than

Site	Score	Description
		80% of the banks were covered by vegetation, of which trees form the dominant vegetation type.
AQ13 Lacustrine Wetland/ Pastoral dam	61	AQ13 represents the pastoral dam located adjacent to the western boundary of the Project site. This water body is mapped on the EHP Wetlands mapping as a lacustrine wetland. This site was found to have a distinct lack of aquatic habitat with very little rubble or gravel present and only the one velocity type present (pool). Heavy deposits of fine materials were present at the site. The banks were moderately stable with small and infrequent areas of erosion mostly healed over. The stream banks were largely covered by vegetation with grasses and sedges forming the dominant vegetation type.

7.0 HABITAT VALUES, POTENTIAL PROJECT IMPACTS AND MITIGATION STRATEGIES

7.1 HABITAT VALUES

Environmental values of aquatic ecosystems are generally dictated by their ability to provide habitat for flora and fauna species, and a source of water for various anthropogenic uses (i.e. agriculture, human consumption, recreation and aesthetic values). Although the ephemeral nature of a watercourse will influence the availability of water and subsequently aquatic habitats, agricultural development within the region has influenced physical characteristics of aquatic habitat. Pressures on the larger systems within the Project site, including Retreat Creek and Taroborah Creek, include a high degree of vegetation modification, which has resulted in narrow riparian corridors, a lower species diversity, increased weed invasion and increased erosion along banks, particularly at stock watering points. Taroborah Creek and its tributaries held an almost monotonic groundcover composition of Buffel Grass, which has inhibited the establishment of native grasses and forbs. Riparian habitats across the Project site were found to support thirty-four weed species including four declared pest species and WONS.

The lacustrine wetland in the central west region of the Project site provides the only permanent water source. Ephemeral watercourses and drainage lines present on the Project site are typical of ephemeral creek systems within the broader region, such that these watercourses typically do not flow during the dry season. Whilst most watercourses and drainage lines were dry during the dry season survey, the southern-most drainage line to Taroborah Creek was found to contain semi-permanent waterholes. Ephemeral systems are subject to wide chemical-physical fluctuations, which are reflected in the species composition of fish found in these types of waterways. To survive in ephemeral creek systems, species must be able to tolerate a wide range of water qualities (Earth Tech 2004). Temperature, salinity and dissolved oxygen are the primary determinants of fish presence in waterways located in arid regions (Glover 1982). Surveys across the project site recorded a total of six fish species that are native and occur commonly in rivers and creeks throughout central-eastern Queensland. Water quality results obtained within the Project site revealed that all recorded fish species exhibit physio-chemical tolerances within the recorded ranges for pH and thermal tolerance. Overall, water bodies on the Project site hold both permanent and temporary aquatic habitats for native fish species, and may provide habitat for breeding and dispersal during periods of high flow.

Wet season macro-invertebrate sampling and analysis in particular, produced relatively low SIGNAL scores and low numbers of invertebrate types, indicating low macro-invertebrate diversity within the river system. Although SIGNAL scores remained low during the dry season sampling, macro-invertebrate diversity was higher. As recruitment by aquatic invertebrates can be slow following floods and drought, it is likely that few species had recolonised to sufficient numbers for detection following heavy rainfall events during the wet season. On the other hand, the dry season survey was conducted during a period of almost no rainfall, providing more than adequate time for less common species to become detectable.

Aquatic or riparian habitats on the Project site have been found to support 5 amphibian, 6 reptile, 33 bird and 10 mammal species. One of these species, the Little Pied Bat (*Chalinolobus picatus*), is listed as Near Threatened under the NC Act. Within the Project site, habitat for this species is largely restricted to the narrow riparian zones along Taroborah Creek and Retreat Creek. However, this species is not dependant on riparian environments for forage and roosting habitat. No strictly aquatic species of conservation significance were recorded during the aquatic surveys.

7.1.1 Wetland Values

The *Environmental Protection Regulation 2008* (s81A) states that the environmental values of wetlands are the qualities that support and maintain:

- (a) the health and biodiversity of the wetland's ecosystems;
- (b) the wetland's natural state and biological integrity;
- (c) the presence of distinct or unique features, plants or animals and their habitats, including threatened wildlife, near threatened wildlife and rare wildlife under the *Nature Conservation Act 1992*;
- (d) the wetland's natural hydrological cycle;
- (e) the natural interaction of the wetland with other ecosystems, including other wetlands.

The Project site is located in the Lower Nogoa / Theresa Creek Sub-basin of the Fitzroy River Basin. Wetland systems on the site were noted for their Moderate to Good aquatic habitat quality by field ecologists and their importance as permanent and semi-permanent water sources in a region characterised by ephemeral watercourses.

Lacustrine Wetlands

Two lacustrine wetlands (created by dams) were mapped on the Project site. Neither is consistent with any vegetation community under Queensland's Regional Ecosystem framework. The larger dam in the central west of the Project site was found to support substantial and complex habitat for fauna, with little evidence of erosion due to an abundance of vegetation both in and surrounding the dam.

Permanent waterbodies on the Project site are likely to provide important habitat for a number of common amphibian species, particularly given the ephemeral nature of watercourses and floodplain wetlands. The larger lacustrine wetland in the central west area of the site provides the only source of permanent water. This dam has been scored as Medium under the ACA.

Palustrine Wetlands

One large, ephemeral palustrine wetland was identified in the north-west of the Project site, incorporating two smaller palustrine wetlands mapped by EHP on wetlands mapping. These smaller wetlands have been scored as Medium under the Aquatic Conservation Assessment (ACA).

During the dry season survey, only a small quantity of water was evident. Field ecologists considered the wetland to support good aquatic habitat, with evidence of variation in substrate and cover elements. Vegetation is dominated by grass species, which vegetate the banks of the wetland.

Some vegetation communities on the Project site have been noted for their potential to utilise groundwater by field ecologists. However, vegetation associated with palustrine wetlands on the site is limited to shrub and groundcover species, reducing the likelihood for groundwater dependence.

Remnant Regional Ecosystems Associated with Wetlands

A close association was noted between EHP mapped palustrine wetlands and REs along Retreat Creek in the north of the Project site. These REs are considered to be 51-80% wetland and are



typically River Red Gum Riparian Woodland (RE 11.3.25 – *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines) with a small segment (26.2 ha) of River Teatree Riparian Woodland (RE 11.3.3a – Riverine wetland or fringing riverine wetland/ *Melaleuca bracteata* woodland on alluvial plains).

While Retreat Creek itself is not considered likely to receive surface expressions of groundwater, measured groundwater levels in the vicinity of Retreat Creek are approximately 6-10 mbgl. Deep-rooted vegetation species, such as Eucalypt species of RE 11.3.25, therefore have the potential to utilise sub-surface groundwater.

Waterholes

A few semi-permanent waterholes exist within the Project site, although some of these may become dry at certain times of the year. These areas should be monitored pre- and post-wet season, with the emphasis upon water quality and invertebrate fauna. This is in recognition of their importance and high conservation value to the ecology of the region. These waterholes are vital refuges to the aquatic biota, and in the dry season, may be the only available watering points for wildlife.

Habitat Quality

Water bodies on the Project site, including watercourses and dams, hold both permanent and temporary aquatic habitats for native fish species, and may provide habitat for breeding and dispersal during periods of high flow. The habitat assessment (refer to Section 6.7) revealed that most wetlands were characterised as providing relatively good aquatic habitat. Some wetlands and dams received lower scores, falling into the Moderate category. These sites were found to be ephemeral / not flowing, lacking in aquatic habitat variability, and exhibited indications of bank instability.

7.2 PROJECT IMPACTS

The Project will have limited impacts upon the catchments (and in some areas) the beds of watercourses in the north of MDL467. Where possible, infrastructure has been located to avoid Project impacts upon higher order watercourses, for example impacts upon the first order drainage line which flows into Taraborah Creek and the fourth order stream located in the north of the Project site (Retreat Creek) have been avoided. However, underground mining will result in land subsidence to the north of Capricorn Highway, with limited impacts upon both the first and second order streams that drain into Retreat Creek (refer to Figure 14 for details of the aquatic vegetation communities that will be subsided by underground mining).

Potential impacts upon aquatic environmental values which may occur as a result of the Project are summarised below.

7.2.1 Removal / Alteration of Aquatic Habitat

The land subsidence which will occur as a result of underground mining activities will have limited impact upon ephemeral aquatic habitat (Community C6) located north of the Capricorn highway (refer to Figure 14 for disturbance details).

The man-made dam (Community C4) may also be impacted by underground subsidence.

No ecosystems were encountered on the Project site which exhibited a high potential for interaction with the surface expression of groundwater (groundwater dependent ecosystems (GDEs)), except for a creek which flows northward towards Retreat Creek that is fed by a local spring (sampling location



TAS 11). During the dry season, Retreat Creek and Taroborah Creek were not found to be flowing and therefore, these water courses do not appear to receive flows from surface expressed groundwater.

Since groundwater levels in the vicinity of Retreat Creek have been recorded approximately six metres below ground level, only deep-rooted vegetation (such as the Eucalypt trees which form the dominant canopy for Community 1) may use subsurface groundwater as a water supply. During Project operations, a five metre reduction in groundwater level has been modelled for Retreat Creek by operational Year 21 and a 30 m reduction in groundwater level for Taroborah Creek. Such reductions may impact the deep-rooted Eucalypt trees that grow along both Retreat Creek and Taroborah Creek in terms of the availability of local groundwater for these trees.

It is not anticipated that Community 1 and Community 2 shallower-rooted shrubs and groundcover are reliant upon local supplies of groundwater and therefore, would not be impacted by groundwater drawdowns which arise during Project operations.

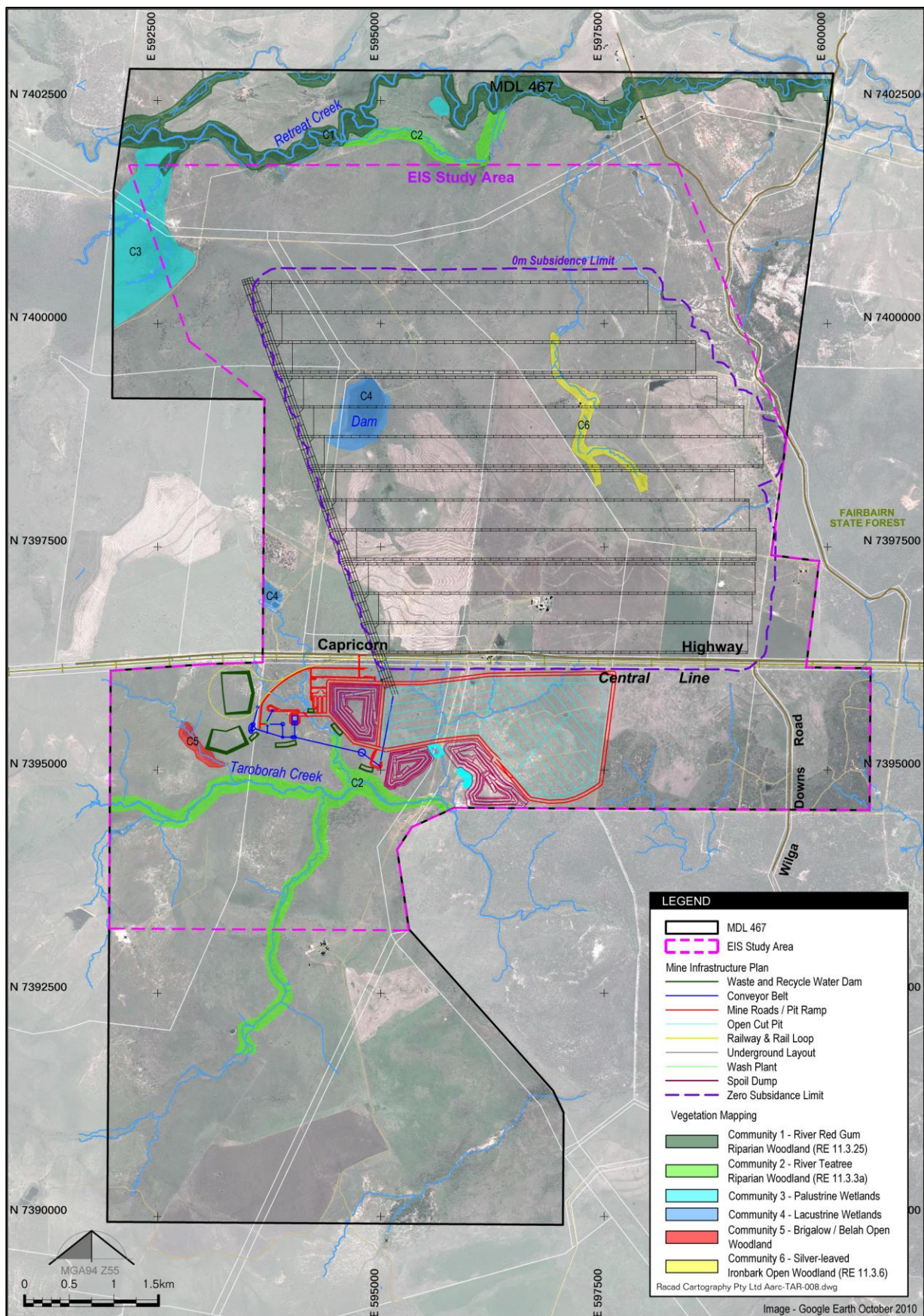


Figure 14 Project Impacts upon Site Watercourses and Drainage Lines

The proposed mine infrastructure and open cut footprint will not result in the loss of semi-permanent and ephemeral aquatic habitat, however, the land subsidence which will occur as a result of underground mining has the potential to impact approximately 33.1 ha of ephemeral aquatic habitat associated with various tributaries (Community 6). Although this community constitutes a watercourse shown on the Vegetation Management Watercourse Map and will be impacted by subsidence, it will only need to be considered for offset under QEOP 2014 if subsidence impacts cannot be managed and prove to be permanent. Since the modelled subsidence along creek drainage lines is minimal, appropriate subsidence management works will address these temporary impacts and therefore, offsets should not be necessary.

Mine subsidence is a well-known impact of underground mining and has the potential to cause disturbance to ecosystems occurring on the surface. Mining under watercourses on floodplains and flat-lying areas, may result in localised diversion of natural flows and potentially increase the frequency and severity of flooding and erosion (NSW DPI 2006). This is not of particular concern for the Project, as only two drainage lines with limited areas fit this category.

A summary of Project impacts upon the aquatic habitat is presented in Table 41.

Table 41 Project Impacts upon Aquatic Vegetation Communities

	Area of Direct Impacts (ha)		Area of Subsidence Impacts (ha)
	Mine Infrastructure	Open cut Mine	Underground Mine
Aquatic Vegetation Community	0	0	33.1
Total	0		33.1
Total Direct and Subsidence Impact Area			33.1

A variety of surface water drainage lines will also be impacted by the development of mine infrastructure; the open-cut pit and underground mining subsidence (refer to Figure 14 for details). However, these drainage lines are not considered to represent aquatic vegetation communities since they are part of either cropped or low-intensity cattle grazing land.

Since the layout of mine infrastructure and associated mine-impacted surface water have been designed to avoid Taroborah Creek, it is expected that this infrastructure will have minimal impact upon aquatic habitats and the natural flow regime of this creek. The tributaries of Taroborah Creek are ephemeral in nature and drain quickly with no permanent waterholes. For the most part, these tributaries have been subject to previous clearing and cattle grazing activities as well as the introduction of pasture grasses and therefore, do not represent prime aquatic habitat.

7.2.2 Sediment Loading

Sediment laden run-off, construction of mine infrastructure and roadway construction within and adjacent to waterways have the potential to cause excess turbidity in watercourses. Turbidity caused by greater than average volumes of suspended sediment reduces light penetration, which in turn suppresses the activity of algae, macrophytes and macro-invertebrates, which in turn alters the ecological balance of aquatic ecosystems. Turbidity plumes move away from the source, most often in waves following a disturbance. Mobile vertebrate fauna, such as most fish, have the ability to move away from it, but less mobile fauna, such as mussels and macro-invertebrates, are unable to escape its effects.

If high levels of organic particles are present in runoff, further aquatic impacts may occur, due to lack of dissolved oxygen. Watercourse biota use such organic particles as food and consume dissolved oxygen during the digestion process. This process is likely to cause the release of excess nutrients in the water column, thereby creating potentially eutrophic conditions. However, since surface water flows will be managed on site via sediment control fences (during mine construction) and run-off catchment drains (during mine operations), the potential impacts of sediment loading upon local watercourses are not considered to be significant.

7.2.3 Earthworks Erosion and Sediment Deposition

Earthworks that are conducted on the mine site may result in localised soil erosion with a subsequent increase in sediment loading for riparian woodlands downstream of the mine. An increase in sediment loading will potentially reduce riparian habitat quality and may result in biodiversity losses in affected areas.

7.2.4 Contaminant and Nutrient Loading

Potential spills of chemicals and hydrocarbons that are used on the Project site may enter waterways. These chemicals are often toxic and can impact the integrity of watercourses.

Nitrogen and phosphorus are two nutrients that are found in fresh and marine waters and are considered essential to support biological life. These nutrients are found as natural sources in the soil and air and as by-products of human biological and industrial wastes. Nitrates are found in sewage and fertilisers, likewise, phosphates are also found in fertilizers in addition to detergents. Typically the amount of each source varies according to the degree of human activity in the associated airshed and watershed.

Waters having relatively large supplies of nutrients are termed eutrophic (well nourished) and eutrophication is the process by which water bodies are made more eutrophic through an increase in their nutrient supply (Smith, Tilman, & Nekola., 1999). The most common effects of increased nitrogen and phosphorus supplies on aquatic ecosystems are typically perceived as increases in the abundance of algae and aquatic plants. The central issue is as algae and other plants die off the amount of oxygen declines in the water causing eutrophication. Excess nutrients can also lead to algae blooms which become toxic to both humans and aquatic life. This type of algae, blue-green algae, can acquire nitrogen from the air, and when provided with high concentrations of phosphorus (available in the water), the algae growth explodes and creates unhealthy and aesthetically displeasing conditions. Furthermore, eutrophication has also been shown to cause the following impacts to in-stream ecosystems (Smith, Tilman, & Nekola., 1999):

- Increased biomass and changes in species composition of suspended algae and periphyton;



- Reduced water clarity;
- Taste and odor problems;
- Blockage of intake screens and filters;
- Fouling of submerged lines and nets;
- Disruption of flocculation and chlorination processes at water treatment plants;
- Restriction of swimming and other water-based recreation;
- Harmful diel fluctuations in pH and in dissolved oxygen concentrations;
- Dense algal mats reduce habitat quality for macroinvertebrates and fish spawning; and
- Increased probability of fish kills.

Several pathways are associated with the uptake of nitrogen. Nitrogen that enters the environment, in excess of plant growth requirements, may either: (1) accumulate in soils; (2) move from the land into surface waters; (3) migrate into groundwater; or (4) enter the atmosphere via ammonia volatilization and nitrous oxide production. However, a significant fraction of nitrogen that enters the atmosphere subsequently returns to the land and surface waters via wet and dry deposition (Smith, Tilman, & Nekola., 1999).

Like nitrogen, phosphate fertilizers applied to soils have the ability to accumulate. This trend has important implications for eutrophication control because the total amount of phosphorus exported in runoff from the landscape to surface waters increases linearly with the soil phosphorus content (Smith, Tilman, & Nekola., 1999).

Smith, Tilman and Nekola (1999) articulate that different streams will vary in their response to nitrogen and phosphorus. These responses have been shown to vary depending on the watershed area, hydraulic flushing rate and hydraulic residence time of nutrients within the water body (Lohman & Jones, 1999). Several studies have found that high concentrations of inorganic suspended solids can reduce algal yields within waterbodies and observations indicate a combination of high levels of inorganic suspended solids and shorter hydraulic residence times can reduce phosphorus concentrations in mainstream systems.

7.2.5 Wetland Impacts

As the layout of mine infrastructure and associated mine-impacted surface water have been designed to avoid Taroborah Creek, it is expected that this infrastructure will have minimal impact upon aquatic habitats and the natural flow regime of this creek. The tributaries of Taroborah Creek are ephemeral in nature and drain quickly with no permanent waterholes. For the most part, these tributaries have been subject to previous clearing and cattle grazing activities as well as the introduction of pasture grasses and therefore, do not represent prime aquatic habitat.

Wetlands located within the area subject to subsidence are likely to experience tension cracking along the banks and potentially alterations to the depth and extent of water. The ephemeral nature of the watercourses and many of the wetlands reduce the likelihood of permanent hydrological and ecological impacts. The lacustrine wetland/dam located in the central region of the Project site,



however, is a permanent source of water, and may exhibit changes to its depth and extent as a result of surface subsidence.

Further impacts of subsidence are detailed in the following section.

7.2.6 Surface Subsidence

Underground longwall mining will result in surface subsidence and tension cracking. The area that will be subject to subsidence is shown in Figure 15. Longwall mining will be conducted under the large dam as well as tributaries to the large dam and Retreat Creek.

IMC Mining Group Pty Ltd (IMC) was commissioned by Shenhua to prepare a subsidence assessment based on the most recent mine layout for the Project. The assessment predicted that in the worst case scenario, surface subsidence would result a reduction in land elevation of up to approximately 2 m. It was also estimated that the maximum width of tension cracks will be 0.2 to 0.3 m, down to a depth of approximately 5 m. An assessment of pre and post-mining topography predicted there would be minor changes in elevation following longwall mining and subsidence.

The potential impacts of surface subsidence are described below.

- Subsidence impacts on creek systems may include disturbance to aquatic habitat, loss of stability, release of sediment into the downstream environment, loss of stream flow and riparian vegetation dieback (Hughes 2005);
- Subsidence often leads to the formation of shallow depressions within the beds of watercourses. Although it is considered likely that such depressions will fill with sediment within a few wet seasons, the watercourse may experience increases in flow velocity and erosion in the interim if the watercourse runs tangentially to the line of subsidence. However, considering the affected watercourses are highly ephemeral in nature, it is unlikely that subsidence will have a significant impact on the hydrological regime or erosion potential of these watercourses;
- The drainage profile may experience subtle changes as a result of subsidence. The predicted minor changes in topography may result in additional ponded areas. While most areas of ponding would be shallow and dry quickly after rainfall events, some ponded areas may provide additional habitat for Cane Toads. Areas of significant or long-term ponding may lead to a loss of vegetation community or a shift in species composition. Impacts on surface drainage and other sensitive landscape features will require consideration and appropriate subsidence management strategies will be implemented;
- Surface cracking occurs as a result of tensile strain on the ground surface. Tension cracking may occur within the bed and banks of any watercourses located within the subsidence impact area. It is expected that any cracks will be less than 5 m deep and a maximum width of 0.2 to 0.3 m in the worst case scenario. Subsidence induced cracking within a stream bed may lead to temporary dewatering of permanent pools or non-permanent disruption of surface flows (Hughes 2005). Rehabilitation of surface cracks is likely to require remedial earthworks and the use of sealants. Rehabilitation works may cause disturbance due to the creation of access tracks and removal of riparian vegetation (Hughes 2005); and

- One large dam located in the north-west region of the Project site may be impacted by subsidence. Potential impacts on the dam may include cracking of the embankments and changes to the extent and depth of the water body. Subsidence induced cracking below a surface water body may result in the loss of water to near-surface groundwater flows (Hughes 2005). The severity of subsidence impacts on the dam will depend on the depth of the coal seam to be extracted below the dam. Longwall mining can cause a surface water body to lose flow permanently where the coal seam occurs less than 100 - 120 m below the surface (Hughes 2005). Where a coal seam occurs greater than 150 m below the surface water body, the loss of water may be temporary, unless the area is affected by severe geological disturbance (e.g. strong faulting) (Hughes 2005). Given that, within the region of the dam, the target coal seam occurs approximately 140 -150 m below the surface and there is no evidence of significant faulting from the exploration surveys that have been conducted to date, longwall mining will likely not have permanent impacts on the hydrology of the dam.

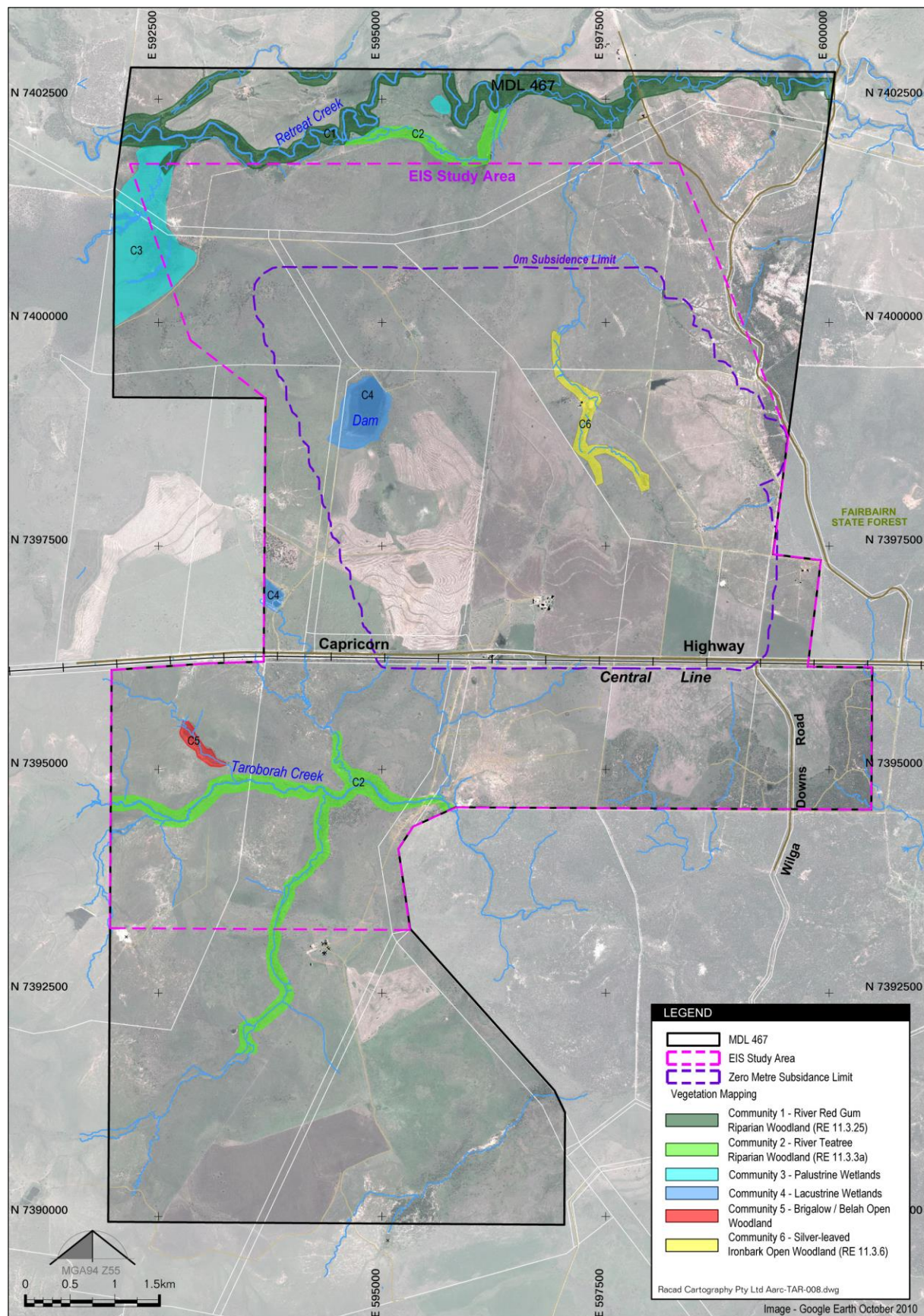


Figure 15 Impacts of Subsidence on Watercourses, Waterbodies and Riparian Communities

7.2.7 Biodiversity Impacts

Earthworks may result in weed invasion, particularly along watercourses within and downstream of the Project site. The Project may result in a loss of aquatic invertebrate diversity and abundance as a result of the potential impacts discussed above.

The loss of aquatic habitat, suitable supply of water (i.e. quality and quantity) and / or prey items (i.e. invertebrate species) may result in a loss of vertebrate species associated with aquatic values (including Threatened species).

Anthropogenic disturbances in an area will often facilitate the increase in feral animal numbers (e.g. the development of new roads will open up the landscape and improve access for exotic predators such as red foxes and feral cats, etc.). An increase in feral animal numbers may impact local, native animals, leading to a decrease in their population sizes.

Furthermore, noise, vibration and dust associated with the construction and operational phases of the Project may result in some fauna species avoiding aquatic habitats that they currently utilise.

REs associated with watercourses shown on the Vegetation Management Watercourse Map are classed as a MSES under the QEOP. Watercourses within the area of impact are classed as stream orders 1 and 2. A buffer area of 25 m to protect ecological integrity of either side of each impacted watercourse will be applied as part of the offset strategy, if indeed offsets are found to be required, due to the presence of residual impacts. No other aquatic MSES will be impacted by the proposed Project.

7.3 AMELIORATIVE MEASURES

Suggested strategies to minimise Project impacts upon native flora and fauna, and Project site rehabilitation recommendations are outlined below.

7.3.1 General Aquatic Flora and Fauna Management Strategies

- All contaminated mine water and process water should be contained within a closed-loop system and recycled. No contaminated mine water or process water should be discharged from the Project site;
- Sediments traps should be designed downstream of all land disturbances such as waste rock dumps, in order to remove sediment from storm water flowing off these areas prior to release;
- All potentially acid forming waste rock should be encapsulated within non-acid forming materials so that acid mine drainage does not impact the local environment;
- The water quality and sediment quality monitoring program initiated for this study should be continued throughout the Project life. This program would ensure that the early detection of impacts is identified and documented, thereby allowing mitigation strategies to be altered or developed;
- Area of the Project site that has been disturbed should be stabilised immediately upon completion of mining activities. Where possible, a 50m buffer zone should be implemented around sensitive Regional Ecosystems;



- Habitat clearing should be conducted only after:
 - the areas to be cleared have been clearly delineated and identified to equipment operators and supervisors; and
 - suitable erosion and sediment control structures are in place.

Measures should be taken to minimise harm to affected fauna communities by inspecting the vegetation to be disturbed prior to clearing, in order to ascertain whether or not any fauna are present. If fauna is present, it should be given the opportunity to move on naturally before clearing occurs;

- A segment of the Staff Induction Program should be allocated to informing staff of the conservation values on the Project site and surrounding areas to increase staff awareness of the species present. This could include photographs, brief descriptions and management requirements of native species;
- A Pest Management Plan should be developed in order to monitor the presence of, and success of control strategies for, pest plant and animal species within the Project site; and
- The rehabilitation strategy developed for the Project site should embody the concepts and recommendations presented above and include provision for monitoring of rehabilitation progress over the life of the operation. The establishment of aquatic snags in riparian habitats should be included in the rehabilitation strategy.

7.3.2 Nutrient Management Measures

Nutrient limitation is a key concept in the management of eutrophication of waterways associated with the Project site. The concept of nutrient limitation implies: (1) that one key nutrient should be the primary limiting factor for plant growth in a given ecosystem; (2) that the growth of plants in a given ecosystem should be proportional to the rate of supply of this nutrient; and (3) that control of eutrophication should be accomplished by restricting the loading of this key nutrient to the ecosystem.

Previous studies have emphasised the significance of phosphorus as a water pollutant due to its ability to stimulate the growth of algae and other aquatic plants (Smith, Tilman, & Nekola., 1999). However, recent data suggest enrichment with both phosphorus and nitrogen together often produces higher algal yields than additions of these nutrients alone, therefore phosphorus and nitrogen are considered co-limiting to algal communities in streams.

The control of excessive nutrient loading requires an understanding of the loading of nutrients, their availability, and the quantification of the relationship between nutrient load and eutrophication response (Lee & Jones, 2005). Typically, simple concentration-based standards are unreliable for effective eutrophication control, therefore, the successful eutrophication management and control on the Project site is based primarily on the prevention of nitrogen and phosphorus escaping from the landscape into the receiving waters.

Nutrient restrictions will be achieved on the Project site by the following measures:

- Diversion of wastewater effluents as part of the surface water management system on the Project site which retains dirty water and diverts clean surface water;



- Restrict the use of phosphate-containing detergents where practical;
- Where possible, bioactive glyphosate shall be used for the treatment of weeds that are located in close proximity to watercourses;
- Installation of sewage treatment facilities with sufficient capacity to handle site waste; and
- Monitoring of receiving waters.

Monitoring of the receiving waters will identify any factors regulating internal sources of nutrients and within-stream nutrient dynamics and will assist in developing objective criteria used in judging acceptable versus non-acceptable water quality. Water quality monitoring is further discussed in Section 7.3.4.

7.3.3 Management of Pest Flora and Fauna

7.3.3.1 Weed Management Strategies

Four plant species declared under the LP Act were recorded in riparian areas during the survey. These species are:

- Fireweed (*Senecio madagascariensis*);
- Parkinsonia (*Parkinsonia aculeata*);
- Parthenium (*Parthenium hysterophorus*); and
- Lantana (*Lantana camara*).

Three of these species – Fireweed, Parkinsonia and Parthenium – are listed as a Class 2 pest plants. Class 2 plants are those that are established in Queensland and have, or could have, an adverse economic, environmental or social impact. Landowners are expected to take reasonable steps to keep land free from Class 2 pests. It is an offence to move or transport a vehicle on a road if it is known, or should be known, that it is contaminated with a declared plant. Measures to control the spread of these weeds, including vehicle wash-downs and weed and seed inspections, should be adopted across the Project. Biosecurity Queensland promotes a number of wash-down procedures, enabling industry to meet these requirements.

Lantana is a Class 3 declared pest plant. Lantana cannot be sold or distributed and landholders may be required to control these plants in the event that they pose a threat to an environmentally significant area.

It is recommended that a Pest Management Plan be developed to limit the spread of declared pest plant species on the Project site. Staff should be informed of the species of weed likely to be encountered on the Project site, the location of known weed infestations (particularly Parthenium), and how to report the presence of new infestations.

Pest Fact Sheets (made available by DAFF) of the weed species that were identified within the Project site detail the most effective methods of eradication. Pest Fact Sheets should be consulted (Appendix F) when developing weed eradication / management strategies.

7.3.3.2 Pest Fauna Management Strategies

One introduced pest fauna species, the Cane Toad (*Rhinella marina*), was recorded during the aquatic ecology site surveys.

The Cane Toad is a non-declared species under the LP Act, meaning that there is no legislative requirement for the control of this species within the Project site. However, it is recommended that the activities within the Project site should not facilitate any increase in the population numbers of non-declared animals.

7.3.4 Management of water quality

It is recommended that Project site water quality continues to be monitored prior to any Project activities occurring, throughout the life of the Project, and during decommissioning and rehabilitation of the Project. As background water quality exceeds some parameters provided in the ANZECC Guidelines, it will be necessary to set site-specific water quality targets for the Project.

The sampling programme for surface water, ground water and sediment, including the setting of site-specific trigger and target values, should be developed according to the conditions agreed as part of the EA negotiations.

Surface water reference sites have been established upstream, downstream, and midstream within the Project site. Upstream and downstream monitoring allow for natural variations in water quality, sediment quality, and topography, to be accounted for. Background surface water and sediment quality data has been collected for the Project site, which will be used to set Environmental Authority limits for surface water and sediment quality.

7.3.4.1 Water Quality

Six months of water quality sampling has been completed and should continue for a period of 12 to 24 months in order to collect a total of 18 sets of data. The water quality data should be analysed for at least those parameters outlined in Section 5.2.2. When streams are not flowing, water should continue to be collected from pools of standing water where water is available. When obtaining samples during and after flow events, sampling should allow for potentially high contaminant-load water (i.e. first flush), and more dilute water to be analysed to determine the range of background water for the area.

It is recommended that water quality analysis results be compiled into an Environmental Monitoring database. Reference data using indicators such as water quality parameters outlined in the ANZECC (2000) Guidelines will allow the environmental values outlined in the *Environmental Protection (Water) Policy 1997* to be identified and protected. Once sufficient data is available, the data should be reassessed, and trigger levels for the Environmental Authority set as per the Queensland Water Quality Guidelines (2009), where site-specific contaminant limits are necessary.

7.3.4.2 Permanent / Semi-permanent Waterholes

A few semi-permanent waterholes exist within the Project, although some of these may become dry at certain times of the year. These areas should be monitored pre- and post-wet season, with the emphasis upon water quality and invertebrate fauna. This is in recognition of their importance and high conservation value to the ecology of the region. These waterholes are vital refuges to the aquatic biota, and in the dry season, may be the only available watering points for wildlife.

7.3.5 Subsidence Management Strategies

Subsidence resulting from longwall underground mining can have varied impacts on aquatic ecosystems. To mitigate these impacts a Subsidence Management Plan will be developed in accordance with the requirements of the EHP guideline *Watercourse Subsidence – Central Queensland Mining Industry (DRAFT Version 7)*.

- Watercourses and wetlands located within the subsidence impact zone should undergo regular monitoring throughout the life of underground mining to detect any alterations to the beds and banks. Monitoring will identify any necessary mitigation measures and aid in ensuring that no long term impacts arise. Monitoring should be conducted in accordance with the requirements of a Subsidence Management Plan. Erosion controls should be implemented where subsidence causes alteration to stream beds or banks.
- Because cracking will only occur over a small portion of the subsided area, the exact locations of tension cracks will need to be confirmed through monitoring. Surface cracks will then be rehabilitated using remedial earthworks and, if necessary, the use of sealants. While tension cracking will not necessarily impact on vegetation communities, the rehabilitation of cracks may lead to impacts on vegetation as outlined above. Consequently the rehabilitation of cracks will need to be managed appropriately to avoid impacts on vegetation. A rehabilitation plan should be prepared to guide remediation works on tension cracks whilst minimising impacts on surrounding ecosystem values. The rehabilitation program should be designed to ensure that any vegetation communities disturbed during repairs to tension cracks are returned to pre-disturbance condition.
- Subsidence-induced ponding will be mitigated by the completion of minor remedial drainage earthworks to re-establish free drainage. Minor remedial drainage works shall ensure that subsidence does not result in hydrological changes that would impact the ecological functioning of subsided areas.
- The large dam should be monitored for subsidence impacts such as cracking of the embankment or changes in lateral extent or depth of the water body. Remedial earthworks should be implemented as required.

7.4 CONCLUSIONS

The following conclusions have been developed from this assessment:

- The Project site contains two lacustrine wetlands, four palustrine wetlands, two major creeks (i.e. Retreat Creek and Taroborah Creek) and several mapped drainage lines that are ephemeral in nature;
- The drainage lines held little to no water during the dry season survey, however, the majority of creeks and drainage lines were flowing during the wet season survey. This ephemerality is common in the region;
- The results from the baseline surveying of water quality within the Project site show that water exceeds trigger values provided in the ANZECC (2000) Aquatic Ecosystems Guidelines at one or more sites for pH, DO, SPC, total Nitrogen, total Phosphorus, and Aluminium. None of the water quality data exceeded the proposed trigger values provided in the ANZECC (2000) Livestock Drinking Water Guidelines or the ANZECC (2000) Irrigation trigger values;
- The results from the baseline surveying of stream sediment quality within the Project site indicate that levels of Silver (Ag), Chromium (Cr) and Nickel (Ni) exceeded the Interim Sediment Quality Guidelines (ISQG) values at several sites. In particular, Nickel exceeded the high ISQG values at seven sites (i.e. TAS3, TAS4, TAS8, TAS9, TAS12, AQ04 and AQ08);
- A total of 47 macro-invertebrate taxa were identified during the wet season and dry season surveys. SIGNAL scoring showed no sites fell within the “pristine” category of Quadrant 1. All dry season sampling sites fell within Quadrant 2 (often indicating high salinity or nutrient levels that may be natural), while the majority of sites sampled during the wet season fell within Quadrant 4 (usually indicating urban, industrial, or agricultural pollution). This is most likely a result of the ephemeral nature of the watercourses within the region and sub-optimal timing in regards to flooding prior to the wet season survey;
- A total of six fish species, five amphibians (one introduced), two reptiles and thirty-three birds (three of which are listed under the EPBC Act as Migratory and Marine), and ten mammal species were identified during the aquatic surveys;
- The Little Pied Bat was recorded during the dry season aquatic survey. This species is listed as Near Threatened under the NC Act;
- One pest fauna species, the Cane Toad, was recorded during the site surveys. The Cane Toad is not a declared species under the LP Act;
- A total of thirty-four weed species, including three Class 2 State Declared species – Parthenium, Parkinsonia and Fireweed – were identified within riparian habitats. Furthermore, the Class 3 weed species Lantana and several other weed species not declared under the LP Act were identified within the Project site;
- No Rare or Threatened plant species were positively identified during the aquatic ecology assessment. Retreat Creek is fringed by Regional Ecosystem 11.3.25 (*Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage lines), which is listed as Least Concern under the Vegetation Management Act, but exhibits an Of Concern EHP Biodiversity Status, due to weed infestation and habitat degradation. Taroborah Creek is fringed by

Regional Ecosystem 11.3.3a (*Melaleuca bracteata* riparian woodland), which is listed by the EHP Biodiversity Status and Vegetation Management Act as Of Concern. This listing is due to previous grazing activities which have led to ground layer modifications, thinning of canopy trees and invasion by weed species;

- Habitat assessments showed that, with the exception of AQ05 (located on Retreat Creek), Retreat Creek, Taraborah Creek and their associated tributaries fell within the 'relatively good' category, whilst the pastoral dam and some wetlands generally fell within the 'moderate' category;
- Limited subsidence will occur in the north of the Project site due to underground mining activities, however the limited subsidence impacts upon local flora and fauna will be managed via the remediation of tension cracks and drainage channels; and
- Aquatic flora and fauna are most at risk from clearing and increased sedimentation of watercourses. The riparian vegetation community most likely to be impacted by the Project (via land subsidence) is the Silver-leaved Ironbark Open Woodland (RE 11.3.6 – Community C6) located in the north of the Project site. The fauna groups considered to be most at risk include macro-invertebrates, amphibians and fish.

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Appendix A Threatened Species Database Searches



Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 23.0953 to 23.5353
Longitude: 148.4992 to 147.9356
Email: hdick@aacrc.net.au
Date submitted: Monday 28 May 2012 16:04:51
Date extracted: Monday 28 May 2012 16:10:29

The number of records retrieved = 564

Disclaimer

As the DERM is still in a process of collating and vetting data, it is possible the information given is not complete. The information provided should only be used for the project for which it was requested and it should be appropriately acknowledged as being derived from Wildlife Online when it is used.

The State of Queensland does not invite reliance upon, nor accept responsibility for this information. Persons should satisfy themselves through independent means as to the accuracy and completeness of this information.

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Feedback about Wildlife Online should be emailed to Wildlife.Online@derm.qld.gov.au

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	<i>Rhinella marina</i>	cane toad	Y			9
animals	amphibians	Hylidae	<i>Litoria inermis</i>	bumpy rocketfrog		C		6/2
animals	amphibians	Hylidae	<i>Litoria peronii</i>	emerald spotted treefrog		C		3/1
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		10/3
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		18/2
animals	amphibians	Hylidae	<i>Cyclorana brevipes</i>	superb collared frog		C		4
animals	amphibians	Hylidae	<i>Cyclorana cultripes</i>	grassland collared frog		C		2
animals	amphibians	Hylidae	<i>Cyclorana verrucosa</i>	rough collared frog		NT		3
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		6
animals	amphibians	Hylidae	<i>Cyclorana alboguttata</i>	greenstripe frog		C		12/3
animals	amphibians	Hylidae	<i>Cyclorana platycephala</i>	water holding frog		C		1
animals	amphibians	Hylidae	<i>Cyclorana novaehollandiae</i>	eastern snapping frog		C		11/3
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		3/2
animals	amphibians	Hylidae	<i>Litoria rothii</i>	northern laughing treefrog		C		3
animals	amphibians	Limnodynastidae	<i>Limnodynastes salmini</i>	salmon striped frog		C		11/3
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		11
animals	amphibians	Limnodynastidae	<i>Limnodynastes tasmaniensis</i>	spotted grassfrog		C		11/2
animals	amphibians	Limnodynastidae	<i>Limnodynastes terraereginae</i>	scarlet sided pobblebonk		C		2
animals	amphibians	Myobatrachidae	<i>Uperoleia rugosa</i>	chubby gungan		C		1
animals	birds	Acanthizidae	<i>Acanthiza reguloides</i>	buff-rumped thornbill		C		1
animals	birds	Acanthizidae	<i>Acanthiza apicalis</i>	inland thornbill		C		5
animals	birds	Acanthizidae	<i>Acanthiza pusilla</i>	brown thornbill		C		1
animals	birds	Acanthizidae	<i>Gerygone fusca</i>	western gerygone		C		3
animals	birds	Acanthizidae	<i>Smicromis brevirostris</i>	weebill		C		34
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		34
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		13
animals	birds	Acanthizidae	<i>Chthonicola sagittata</i>	speckled warbler		C		4
animals	birds	Acanthizidae	<i>Acanthiza nana</i>	yellow thornbill		C		8
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk		C		4
animals	birds	Accipitridae	<i>Accipiter novaehollandiae</i>	grey goshawk		NT		1
animals	birds	Accipitridae	<i>Erythroriorchis radiatus</i>	red goshawk		E	V	1
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		2
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		C		7
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		61
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		3
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		13
animals	birds	Accipitridae	<i>Circus approximans</i>	swamp harrier		C		5
animals	birds	Accipitridae	<i>Pandion cristatus</i>	eastern osprey		C		3
animals	birds	Accipitridae	<i>Milvus migrans</i>	black kite		C		77
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		5
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		27
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		14
animals	birds	Acrocephalidae	<i>Acrocephalus australis</i>	Australian reed-warbler		C		29
animals	birds	Aegothelidae	<i>Aegotheles cristatus</i>	Australian owl-nightjar		C		5
animals	birds	Alaudidae	<i>Mirafra javanica</i>	Horsfield's bushlark		C		8
animals	birds	Alcedinidae	<i>Ceyx azureus</i>	azure kingfisher		C		12

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anatidae	<i>Anas castanea</i>	chestnut teal		C		1
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		77
animals	birds	Anatidae	<i>Malacorhynchus membranaceus</i>	pink-eared duck		C		18
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		NT		1
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		10
animals	birds	Anatidae	<i>Dendrocygna eytoni</i>	plumed whistling-duck		C		31
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		46
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		111
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		74
animals	birds	Anatidae	<i>Anas rhynchotis</i>	Australasian shoveler		C		15
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		39
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		59
animals	birds	Anseranatidae	<i>Anseranas semipalmata</i>	magpie goose		C		7
animals	birds	Apodidae	<i>Apus pacificus</i>	fork-tailed swift		C		1
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		17
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		52
animals	birds	Ardeidae	<i>Ardea modesta</i>	eastern great egret		C		18
animals	birds	Ardeidae	<i>Ixobrychus flavicollis</i>	black bittern		C		6
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		6
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		67
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		76
animals	birds	Artamidae	<i>Artamus minor</i>	little woodswallow		C		1
animals	birds	Artamidae	<i>Artamus cinereus</i>	black-faced woodswallow		C		10
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		94
animals	birds	Artamidae	<i>Artamus personatus</i>	masked woodswallow		C		1
animals	birds	Artamidae	<i>Strepera graculina</i>	pied currawong		C		5
animals	birds	Artamidae	<i>Artamus cyanopterus</i>	dusky woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		43
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		35
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pied butcherbird		C		75
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		4
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		97
animals	birds	Cacatuidae	<i>Cacatua sanguinea</i>	little corella		C		2
animals	birds	Cacatuidae	<i>Nymphicus hollandicus</i>	cockatiel		C		56
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		32
animals	birds	Campephagidae	<i>Coracina maxima</i>	ground cuckoo-shrike		C		11
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		7
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		61
animals	birds	Campephagidae	<i>Lalage leucomela</i>	varied triller		C		1
animals	birds	Campephagidae	<i>Lalage sueurii</i>	white-winged triller		C		12
animals	birds	Casuariidae	<i>Dromaius novaehollandiae</i>	emu		C		10
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		5
animals	birds	Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)		C		1
animals	birds	Charadriidae	<i>Erythronyx cinctus</i>	red-kneed dotterel		C		4
animals	birds	Charadriidae	<i>Elseyornis melanops</i>	black-fronted dotterel		C		41
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		46

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Charadriidae	<i>Vanellus tricolor</i>	banded lapwing		C		4
animals	birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		NT		3
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		34
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		1
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		76
animals	birds	Columbidae	<i>Phaps chalcoptera</i>	common bronzewing		C		10
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		53
animals	birds	Columbidae	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subspecies)		V	V	1
animals	birds	Columbidae	<i>Geophaps scripta</i>	squatter pigeon		C		1
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		49
animals	birds	Columbidae	<i>Geopelia cuneata</i>	diamond dove		C		4
animals	birds	Columbidae	<i>Columba livia</i>	rock dove	Y			7
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		24
animals	birds	Corcoracidae	<i>Struthidea cinerea</i>	apostlebird		C		33/1
animals	birds	Corvidae	<i>Corvus coronoides</i>	Australian raven		C		37
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		36
animals	birds	Corvidae	<i>Corvus sp.</i>					69
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		22
animals	birds	Cuculidae	<i>Chalcites minutillus minutillus</i>	little bronze-cuckoo		C		3
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		3
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		22/1
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		10
animals	birds	Cuculidae	<i>Cacomantis pallidus</i>	pallid cuckoo		C		5
animals	birds	Cuculidae	<i>Chalcites basalis</i>	Horsfield's bronze-cuckoo		C		8/2
animals	birds	Cuculidae	<i>Cacomantis variolosus</i>	brush cuckoo		C		1
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		5
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		18
animals	birds	Estrildidae	<i>Neochmia modesta</i>	plum-headed finch		C		3
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		28
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		61
animals	birds	Eurostopodidae	<i>Eurostopodus mystacalis</i>	white-throated nightjar		C		1
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		27
animals	birds	Falconidae	<i>Falco subniger</i>	black falcon		C		11
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		3
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		53
animals	birds	Falconidae	<i>Falco longipennis</i>	Australian hobby		C		15
animals	birds	Glareolidae	<i>Stiltia isabella</i>	Australian pratincole		C		2
animals	birds	Gruidae	<i>Grus rubicunda</i>	brolga		C		31
animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		16
animals	birds	Halcyonidae	<i>Todiramphus pyrrhopygius</i>	red-backed kingfisher		C		5
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		10
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		21
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		69
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		42
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		35
animals	birds	Hirundinidae	<i>Petrochelidon ariel</i>	fairy martin		C		14

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Jacanidae	<i>Irediparra gallinacea</i>	comb-crested jacana		C		4
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		1
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		C		18
animals	birds	Laridae	<i>Chlidonias hybrida</i>	whiskered tern		C		4
animals	birds	Maluridae	<i>Malurus leucopterus</i>	white-winged fairy-wren		C		1
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		19
animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		40
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		71
animals	birds	Megaluridae	<i>Cincloramphus cruralis</i>	brown songlark		C		3
animals	birds	Megaluridae	<i>Cincloramphus mathewsi</i>	rufous songlark		C		8
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		5
animals	birds	Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey		C		2
animals	birds	Meliphagidae	<i>Gavicalis virescens</i>	singing honeyeater		C		21
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		45
animals	birds	Meliphagidae	<i>Ptilotula penicillatus</i>	white-plumed honeyeater		C		4
animals	birds	Meliphagidae	<i>Acanthagenys rufogularis</i>	spiny-cheeked honeyeater		C		16
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		24
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		19
animals	birds	Meliphagidae	<i>Manorina flavigula</i>	yellow-throated miner		C		88
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		57
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		5
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		4
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		30
animals	birds	Meliphagidae	<i>Myzomela sanguinolenta</i>	scarlet honeyeater		C		1
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		31
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		41
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		28
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		137
animals	birds	Monarchidae	<i>Myiagra inquieta</i>	restless flycatcher		C		20
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		14
animals	birds	Monarchidae	<i>Myiagra cyanoleuca</i>	satin flycatcher		C		2
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		22
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		38
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		3
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		21
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		17
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		15
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		1
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		16
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		39
animals	birds	Pardalotidae	<i>Pardalotus rubricatus</i>	red-browed pardalote		C		2
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		50
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			6
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		41
animals	birds	Petroicidae	<i>Petroica goodenovii</i>	red-capped robin		C		2
animals	birds	Petroicidae	<i>Microeca fascians</i>	jacky winter		C		5

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		1
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		52
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		40
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		37
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		15
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		10
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		6
animals	birds	Podicipedidae	<i>Podiceps cristatus</i>	great crested grebe		C		29
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		69
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		39
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		1
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		68
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		53
animals	birds	Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		57
animals	birds	Psittacidae	<i>Melopsittacus undulatus</i>	budgerigar		C		3
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	spotted bowerbird		C		24
animals	birds	Rallidae	<i>Porphyrio porphyrio</i>	purple swamphen		C		22
animals	birds	Rallidae	<i>Tribonyx ventralis</i>	black-tailed native-hen		C		1
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		42
animals	birds	Rallidae	<i>Fulica atra</i>	Eurasian coot		C		53
animals	birds	Recurvirostridae	<i>Himantopus himantopus</i>	black-winged stilt		C		43
animals	birds	Recurvirostridae	<i>Recurvirostra novaehollandiae</i>	red-necked avocet		C		2
animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		C		5
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		102
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		47
animals	birds	Rostratulidae	<i>Rostratula australis</i>	Australian painted snipe		V	V	2
animals	birds	Scolopacidae	<i>Gallinago hardwickii</i>	Latham's snipe		C		4/1
animals	birds	Scolopacidae	<i>Tringa stagnatilis</i>	marsh sandpiper		C		5
animals	birds	Scolopacidae	<i>Calidris acuminata</i>	sharp-tailed sandpiper		C		11
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		3
animals	birds	Sturnidae	<i>Sturnus vulgaris</i>	common starling	Y			1
animals	birds	Threskiornithidae	<i>Platalea regia</i>	royal spoonbill		C		22
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		24
animals	birds	Threskiornithidae	<i>Plegadis falcinellus</i>	glossy ibis		C		6
animals	birds	Threskiornithidae	<i>Platalea flavipes</i>	yellow-billed spoonbill		C		22
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		34
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silvereye		C		15
animals	birds	Turnicidae	<i>Turnix velox</i>	little button-quail		C		1
animals	birds	Turnicidae	<i>Turnix varius</i>	painted button-quail		C		1
animals	birds	Tytonidae	<i>Tyto javanica</i>	eastern barn owl		C		7
animals	bony fish	Ambassidae	<i>Ambassis agassizii</i>	Agassiz's glassfish				4
animals	bony fish	Anguillidae	<i>Anguilla reinhardtii</i>	longfin eel				1
animals	bony fish	Apogonidae	<i>Glossamia aprion</i>	mouth almighty				1
animals	bony fish	Ariidae	<i>Neoarius graeffei</i>	blue catfish				4/1
animals	bony fish	Atherinidae	<i>Craterocephalus stercusmuscarum</i>	flyspecked hardyhead				4
animals	bony fish	Belonidae	<i>Strongylura krefftii</i>	freshwater longtom				1

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animals	bony fish	Clupeidae	<i>Nematalosa erebi</i>	bony bream				4
animals	bony fish	Eleotridae	<i>Philypnodon grandiceps</i>	flathead gudgeon				1
animals	bony fish	Eleotridae	<i>Hypseleotris species 1</i>	Midgley's carp gudgeon				4
animals	bony fish	Eleotridae	<i>Hypseleotris compressa</i>	empire gudgeon				2
animals	bony fish	Eleotridae	<i>Oxyeleotris lineolata</i>	sleepy cod				3
animals	bony fish	Eleotridae	<i>Mogurnda adspersa</i>	southern purplespotted gudgeon				2
animals	bony fish	Eleotridae	<i>Hypseleotris klunzingeri</i>	western carp gudgeon				2
animals	bony fish	Melanotaeniidae	<i>Melanotaenia splendida splendida</i>	eastern rainbowfish				4
animals	bony fish	Osteoglossidae	<i>Scleropages leichardti</i>	southern saratoga				2
animals	bony fish	Percichthyidae	<i>Macquaria ambigua</i>	golden perch				4
animals	bony fish	Plotosidae	<i>Tandanus tandanus</i>	freshwater catfish				4
animals	bony fish	Plotosidae	<i>Neosilurus hyrtl</i>	Hyrtl's catfish				4
animals	bony fish	Scorpaenidae	<i>Notesthes robusta</i>	bullrout				1/1
animals	bony fish	Terapontidae	<i>Leiopotherapon unicolor</i>	spangled perch				4/1
animals	bony fish	Terapontidae	<i>Scortum hillii</i>	leathery grunter				3
animals	bony fish	Terapontidae	<i>Amniataba percoides</i>	barred grunter				3
animals	mammals	Bovidae	<i>Bos taurus</i>	European cattle	Y			5
animals	mammals	Canidae	<i>Vulpes vulpes</i>	red fox	Y			6
animals	mammals	Canidae	<i>Canis lupus dingo</i>	dingo				1
animals	mammals	Dasyuridae	<i>Sminthopsis macroura</i>	stripe-faced dunnart			C	1
animals	mammals	Emballonuridae	<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail bat			C	3
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			7
animals	mammals	Leporidae	<i>Oryctolagus cuniculus</i>	rabbit	Y			14
animals	mammals	Macropodidae	<i>Macropus dorsalis</i>	black-striped wallaby			C	1
animals	mammals	Macropodidae	<i>Wallabia bicolor</i>	swamp wallaby			C	11
animals	mammals	Macropodidae	<i>Macropus robustus</i>	common wallaroo			C	3
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo			C	16
animals	mammals	Molossidae	<i>Chaerephon jobensis</i>	northern freetail bat			C	2/1
animals	mammals	Molossidae	<i>Mormopterus beccarii</i>	Beccari's freetail bat			C	1
animals	mammals	Molossidae	<i>Tadarida australis</i>	white-striped freetail bat			C	2
animals	mammals	Molossidae	<i>Mormopterus sp. 2</i>	eastern freetail bat			C	1
animals	mammals	Molossidae	<i>Mormopterus planiceps</i>	southern freetail bat			C	1
animals	mammals	Muridae	<i>Pseudomys delicatulus</i>	delicate mouse			C	4
animals	mammals	Muridae	<i>Hydromys chrysogaster</i>	water rat			C	3
animals	mammals	Muridae	<i>Pseudomys desertor</i>	desert mouse			C	1
animals	mammals	Muridae	<i>Leggadina forresti</i>	Forrest's mouse			C	2
animals	mammals	Muridae	<i>Rattus sordidus</i>	canefield rat			C	6/6
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat			C	5
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			11
animals	mammals	Muridae	<i>Pseudomys gracilicaudatus</i>	eastern chestnut mouse			C	2/1
animals	mammals	Peramelidae	<i>Isoodon macrourus</i>	northern brown bandicoot			C	2
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider			C	3
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum			C	7
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala			C	2
animals	mammals	Potoroidae	<i>Aepyprymnus rufescens</i>	rufous bettong			C	7
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider			C	1

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animals	mammals	Pteropodidae	<i>Pteropus scapulatus</i>	little red flying-fox		C		2
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			3
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		C		6
animals	mammals	Vespertilionidae	<i>Chalinolobus picatus</i>	little pied bat		NT		2/1
animals	mammals	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's wattled bat		C		3/2
animals	mammals	Vespertilionidae	<i>Vespadelus pumilus</i>	eastern forest bat		C		1
animals	mammals	Vespertilionidae	<i>Scotorepens greyii</i>	little broad-nosed bat		C		7/1
animals	mammals	Vespertilionidae	<i>Nyctophilus sp.</i>					1
animals	mammals	Vespertilionidae	<i>Miniopterus schreibersii oceanensis</i>	eastern bent-wing bat		C		1
animals	mammals	Vespertilionidae	<i>Chalinolobus nigrogriseus</i>	hoary wattled bat		C		1/1
animals	mammals	Vespertilionidae	<i>Scotorepens balstoni</i>	inland broad-nosed bat		C		3
animals	mammals	Vespertilionidae	<i>Nyctophilus geoffroyi</i>	lesser long-eared bat		C		1/1
animals	mammals	Vespertilionidae	<i>Vespadelus troughtoni</i>	eastern cave bat		C		1
animals	reptiles	Agamidae	<i>Intellagama lesueurii</i>	eastern water dragon		C		1
animals	reptiles	Agamidae	<i>Tympanocryptis lineata</i>	lined earless dragon		C		3/3
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		9/1
animals	reptiles	Agamidae	<i>Amphibolurus nobbi</i>			C		2
animals	reptiles	Agamidae	<i>Amphibolurus burnsi</i>			C		1
animals	reptiles	Agamidae	<i>Amphibolurus gilberti</i>	Gilbert's dragon		C		5/1
animals	reptiles	Agamidae	<i>Chlamydosaurus kingii</i>	frilled lizard		C		1
animals	reptiles	Agamidae	<i>Diporiphora australis</i>			C		2/1
animals	reptiles	Boidae	<i>Antaresia maculosa</i>	spotted python		C		6/2
animals	reptiles	Boidae	<i>Aspidites melanocephalus</i>	black-headed python		C		1
animals	reptiles	Carphodactylidae	<i>Nephrurus asper</i>	spiny knob-tailed gecko		C		2/1
animals	reptiles	Chelidae	<i>Rheodytes leukops</i>	Fitzroy River turtle		V	V	2
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		3/1
animals	reptiles	Chelidae	<i>Wollumbinia latisternum</i>	saw-shelled turtle		C		1
animals	reptiles	Chelidae	<i>Elseya albagula</i>	southern snapping turtle		C		3/2
animals	reptiles	Chelidae	<i>Emydura macquarii krefftii</i>	Krefft's river turtle		C		8/2
animals	reptiles	Colubridae	<i>Dendrelaphis punctulata</i>	common tree snake		C		5
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		4/1
animals	reptiles	Colubridae	<i>Boiga irregularis</i>	brown tree snake		C		3/2
animals	reptiles	Diplodactylidae	<i>Diplodactylus conspicillatus</i>	fat-tailed diplodactylus		C		1
animals	reptiles	Diplodactylidae	<i>Diplodactylus vittatus</i>	wood gecko		C		1
animals	reptiles	Diplodactylidae	<i>Strophurus williamsi</i>	soft-spined gecko		C		2
animals	reptiles	Diplodactylidae	<i>Oedura monilis</i>			C		7/4
animals	reptiles	Elapidae	<i>Pseudechis australis</i>	king brown snake		C		3
animals	reptiles	Elapidae	<i>Cryptophis boschmai</i>	Carpentaria whip snake		C		3/2
animals	reptiles	Elapidae	<i>Hoplocephalus bitorquatus</i>	pale-headed snake		C		2/1
animals	reptiles	Elapidae	<i>Denisonia maculata</i>	ornamental snake		V	V	3/1
animals	reptiles	Elapidae	<i>Demansia torquata</i>	collared whip snake		C		1
animals	reptiles	Elapidae	<i>Furina diadema</i>	red-naped snake		C		1
animals	reptiles	Elapidae	<i>Brachyuropsis australis</i>	coral snake		C		1
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		2
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		8/2
animals	reptiles	Elapidae	<i>Vermicella annulata</i>	bandy-bandy		C		2/1

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animals	reptiles	Elapidae	<i>Suta suta</i>	myall snake		C		8/5
animals	reptiles	Gekkonidae	<i>Hemidactylus frenatus</i>	house gecko	Y			4
animals	reptiles	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's gecko		C		23/2
animals	reptiles	Gekkonidae	<i>Gehyra catenata</i>			C		10/1
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>			C		8/6
animals	reptiles	Pygopodidae	<i>Paradelma orientalis</i>	brigalow scaly-foot		V	V	1
animals	reptiles	Pygopodidae	<i>Lialis burtonis</i>	Burton's legless lizard		C		1
animals	reptiles	Scincidae	<i>Carlia munda</i>			C		1
animals	reptiles	Scincidae	<i>Menetia greyii</i>			C		6
animals	reptiles	Scincidae	<i>Menetia timlowi</i>			C		1/1
animals	reptiles	Scincidae	<i>Eulamprus quoyii</i>	eastern water skink		C		1/1
animals	reptiles	Scincidae	<i>Lerista fragilis</i>			C		11/1
animals	reptiles	Scincidae	<i>Carlia pectoralis</i>			C		7
animals	reptiles	Scincidae	<i>Ctenotus robustus</i>			C		14/2
animals	reptiles	Scincidae	<i>Egernia striolata</i>	tree skink		C		2/1
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		9/1
animals	reptiles	Scincidae	<i>Lygisaurus foliorum</i>			C		1
animals	reptiles	Scincidae	<i>Morethia boulengeri</i>			C		27/4
animals	reptiles	Scincidae	<i>Ctenotus taeniolatus</i>	copper-tailed skink		C		3
animals	reptiles	Scincidae	<i>Eulamprus brachysoma</i>			C		1/1
animals	reptiles	Scincidae	<i>Lampropholis delicata</i>			C		2/2
animals	reptiles	Scincidae	<i>Tiliqua rugosa aspera</i>	shingle-back (eastern subspecies)		C		4/1
animals	reptiles	Scincidae	<i>Cryptoblepharus pannosus</i>	ragged snake-eyed skink		C		8/1
animals	reptiles	Scincidae	<i>Glaphyromorphus punctulatus</i>			C		2
animals	reptiles	Scincidae	<i>Cryptoblepharus virgatus sensu lato</i>			C		1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops grypus</i>			C		1/1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops affinis</i>			C		1/1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops ligatus</i>			C		3/3
animals	reptiles	Varanidae	<i>Varanus tristis</i>	black-tailed monitor		C		1
animals	reptiles	Varanidae	<i>Varanus gouldii</i>	sand monitor		C		7
fungi	club fungi	Basidiomycota	<i>Coprinus</i>			C		1/1
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi</i>			C		1
plants	higher dicots	Acanthaceae	<i>Dipteracanthus australasicus subsp. corynothecus</i>			C		1/1
plants	higher dicots	Acanthaceae	<i>Rostellularia adscendens subsp. adscendens</i>			C		1/1
plants	higher dicots	Acanthaceae	<i>Rostellularia adscendens</i>			C		1/1
plants	higher dicots	Aizoaceae	<i>Zaleya galericulata subsp. galericulata</i>			C		1/1
plants	higher dicots	Aizoaceae	<i>Trianthema portulacastrum</i>	black pigweed	Y			1/1
plants	higher dicots	Amaranthaceae	<i>Amaranthus mitchellii</i>	Boggabri weed		C		2/2
plants	higher dicots	Amaranthaceae	<i>Alternanthera nodiflora</i>	joyweed		C		1/1
plants	higher dicots	Amaranthaceae	<i>Achyranthes aspera</i>			C		4/2
plants	higher dicots	Apocynaceae	<i>Carissa ovata</i>	currantbush		C		5
plants	higher dicots	Apocynaceae	<i>Parsonsia lanceolata</i>	northern silkpod		C		2/2
plants	higher dicots	Apocynaceae	<i>Alstonia constricta</i>	bitterbark		C		1
plants	higher dicots	Asteraceae	<i>Verbesina encelioides</i>	crownbeard	Y			2/2
plants	higher dicots	Asteraceae	<i>Calotis lappulacea</i>	yellow burr daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Acmella grandiflora var. brachyglossa</i>			C		1/1

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plants	higher dicots	Asteraceae	<i>Senecio brigalowensis</i>			C		4/4
plants	higher dicots	Asteraceae	<i>Leiocarpa brevicompta</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Cyanthillium cinereum</i>			C		1/1
plants	higher dicots	Boraginaceae	<i>Heliotropium geocharis</i>			C		1/1
plants	higher dicots	Brassicaceae	<i>Rorippa eustylis</i>			C		1/1
plants	higher dicots	Byttneriaceae	<i>Waltheria indica</i>			C		1/1
plants	higher dicots	Byttneriaceae	<i>Melochia pyramidata</i>		Y			1/1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum carronii</i>	ebony tree		C		1
plants	higher dicots	Caesalpiniaceae	<i>Senna costata</i>			C		1/1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum hookeri</i>	Queensland ebony		C		3/3
plants	higher dicots	Caesalpiniaceae	<i>Cassia brewsteri</i>			C		1/1
plants	higher dicots	Capparaceae	<i>Capparis</i>			C		1
plants	higher dicots	Capparaceae	<i>Capparis lasiantha</i>	nipan		C		1/1
plants	higher dicots	Casuarinaceae	<i>Casuarina cristata</i>	belah		C		1
plants	higher dicots	Casuarinaceae	<i>Casuarina cunninghamiana</i>			C		1
plants	higher dicots	Celastraceae	<i>Denhamia oleaster</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Chenopodium auricomiforme</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena birchii</i>	galvanised burr		C		1/1
plants	higher dicots	Chenopodiaceae	<i>Rhagodia spinescens</i>	thorny saltbush		C		1/1
plants	higher dicots	Chenopodiaceae	<i>Salsola australis</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Enchylaena</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Atriplex muelleri</i>	lagoon saltbush		C		2/2
plants	higher dicots	Cleomaceae	<i>Cleome viscosa</i>	tick-weed		C		1/1
plants	higher dicots	Combretaceae	<i>Terminalia oblongata</i>			C		1
plants	higher dicots	Combretaceae	<i>Terminalia oblongata subsp. oblongata</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Polymeria longifolia</i>	polymeria		C		1/1
plants	higher dicots	Convolvulaceae	<i>Ipomoea brownii</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Ipomoea plebeia</i>	bellvine		C		1/1
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides var. villosicalyx</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Convolvulus graminetinus</i>			C		3/3
plants	higher dicots	Convolvulaceae	<i>Ipomoea lonchophylla</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Ipomoea polymorpha</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Polymeria pusilla</i>			C		1/1
plants	higher dicots	Cucurbitaceae	<i>Cucumis picocarpus</i>			C		1/1
plants	higher dicots	Ebenaceae	<i>Diospyros humilis</i>	small-leaved ebony		C		1/1
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum australe</i>	cocaine tree		C		2/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia tannensis subsp. eremophila</i>			C		1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia</i>			C		1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia coghlanii</i>			C		2/2
plants	higher dicots	Euphorbiaceae	<i>Adriana urticoides var. urticoides</i>			C		4/4
plants	higher dicots	Fabaceae	<i>Indigofera colutea</i>	sticky indigo		C		1/1
plants	higher dicots	Fabaceae	<i>Indigofera hirsuta</i>	hairy indigo		C		1/1
plants	higher dicots	Fabaceae	<i>Desmodium filiforme</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Stylosanthes hamata</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Alysicarpus muelleri</i>			C		2/2

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Fabaceae	<i>Indigofera linifolia</i>			C		2/2
plants	higher dicots	Fabaceae	<i>Tephrosia dietrichiae</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Desmodium campylocaulon</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Macroptilium lathyroides</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Rhynchosia minima</i> var. <i>australis</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Vigna lanceolata</i> var. <i>lanceolata</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Sesbania cannabina</i> var. <i>cannabina</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Zornia muriculata</i> subsp. <i>angustata</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Crotalaria mitchellii</i> subsp. <i>mitchellii</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Crotalaria dissitiflora</i> subsp. <i>dissitiflora</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Vigna</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Galactia</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Lotus australis</i>	Australian trefoil		C		1/1
plants	higher dicots	Fabaceae	<i>Vigna suberecta</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Vigna trilobata</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Crotalaria juncea</i>	sunhemp	Y			1/1
plants	higher dicots	Fabaceae	<i>Glycine latifolia</i>			C		4/4
plants	higher dicots	Goodeniaceae	<i>Scaevola humilis</i>			C		1/1
plants	higher dicots	Haloragaceae	<i>Haloragis stricta</i>			C		1/1
plants	higher dicots	Haloragaceae	<i>Haloragis aspera</i>	raspweed		C		1/1
plants	higher dicots	Lamiaceae	<i>Teucrium integrifolium</i>			C		2/2
plants	higher dicots	Lamiaceae	<i>Basilicum polystachyon</i>			C		1/1
plants	higher dicots	Loranthaceae	<i>Dendrophthoe homoplastica</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum</i> var. <i>incanum</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Malvastrum americanum</i> var. <i>americanum</i>		Y			2/2
plants	higher dicots	Malvaceae	<i>Abelmoschus ficulneus</i>	native rosella		C		2/2
plants	higher dicots	Malvaceae	<i>Hibiscus verdcourtii</i>			C		2/2
plants	higher dicots	Malvaceae	<i>Gossypium sturtianum</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Abutilon guineense</i>			C		2/2
plants	higher dicots	Malvaceae	<i>Abutilon nobile</i>			C		2/2
plants	higher dicots	Malvaceae	<i>Sida pleiantha</i>			C		2/2
plants	higher dicots	Malvaceae	<i>Sida spinosa</i>	spiny sida	Y			1/1
plants	higher dicots	Malvaceae	<i>Sida laevis</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Hibiscus</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia harpophylla</i>	brigalow		C		5/1
plants	higher dicots	Mimosaceae	<i>Acacia omalophylla</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia salicina</i>	doolan		C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia shirleyi</i>	lancewood		C		1
plants	higher dicots	Mimosaceae	<i>Albizia lebbbeck</i>	Indian siris		C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia melvillei</i>			C		4/4
plants	higher dicots	Mimosaceae	<i>Acacia holosericea</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia leiocalyx</i> subsp. <i>leiocalyx</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Neptunia gracilis</i> forma <i>gracilis</i>			C		2/2
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i> subsp. <i>excelsa</i>			C		2/2
plants	higher dicots	Mimosaceae	<i>Acacia stenophylla</i>	belalie		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Moraceae	<i>Ficus opposita</i>			C		1
plants	higher dicots	Myoporaceae	<i>Eremophila mitchellii</i>			C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus cambageana</i>	Dawson gum		C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus thozetiana</i>			C		1
plants	higher dicots	Myrtaceae	<i>Melaleuca tamariscina</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Corymbia erythrophloia</i>	variable-barked bloodwood		C		1/1
plants	higher dicots	Myrtaceae	<i>Melaleuca linariifolia</i>	snow-in summer		C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus camaldulensis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus coolabah</i>	coolabah		C		3/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus populnea</i>	poplar box		C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus tenuipes</i>	narrow-leaved white mahogany		C		2/2
plants	higher dicots	Myrtaceae	<i>Melaleuca viminalis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia dallachiana</i>			C		2
plants	higher dicots	Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay ash		C		1
plants	higher dicots	Myrtaceae	<i>Corymbia clarksoniana</i>			C		2
plants	higher dicots	Nyctaginaceae	<i>Boerhavia pubescens</i>			C		1/1
plants	higher dicots	Nyctaginaceae	<i>Boerhavia sp. (St George A.Hill AQ399299)</i>			C		1/1
plants	higher dicots	Nyctaginaceae	<i>Boerhavia dominii</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa</i> var. <i>microcarpa</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Jasminum didymum</i> subsp. <i>lineare</i>			C		1/1
plants	higher dicots	Pentapetaceae	<i>Melhania oblongifolia</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Notoleptopus decaisnei</i> var. <i>decaisnei</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>			C		3/3
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus lacunarius</i>			C		1/1
plants	higher dicots	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		1
plants	higher dicots	Pittosporaceae	<i>Bursaria incana</i>			C		2/1
plants	higher dicots	Plumbaginaceae	<i>Plumbago zeylanica</i>	native plumbago		C		1/1
plants	higher dicots	Proteaceae	<i>Grevillea decora</i> subsp. <i>decora</i>			C		1/1
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		2
plants	higher dicots	Rhamnaceae	<i>Ventilago viminalis</i>	supplejack		C		1/1
plants	higher dicots	Rubiaceae	<i>Oldenlandia corymbosa</i> var. <i>corymbosa</i>		Y			1/1
plants	higher dicots	Rubiaceae	<i>Oldenlandia coerulescens</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Psydrax johnsonii</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Spermacoce brachystema</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Geijera parviflora</i>	wilga		C		2/1
plants	higher dicots	Rutaceae	<i>Flindersia dissosperma</i>			C		2/2
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>			C		1/1
plants	higher dicots	Sapindaceae	<i>Atalaya hemiglauca</i>			C		2
plants	higher dicots	Sapindaceae	<i>Alectryon oleifolius</i> subsp. <i>elongatus</i>			C		2/2
plants	higher dicots	Sparrmanniaceae	<i>Corchorus trilocularis</i>			C		2/2
plants	higher dicots	Sterculiaceae	<i>Brachychiton rupestris</i>			C		1
plants	higher dicots	Thymelaeaceae	<i>Pimelea haematostachya</i>			C		2/2
plants	higher dicots	Thymelaeaceae	<i>Pimelea microcephala</i> subsp. <i>microcephala</i>			C		2/2
plants	higher dicots	Verbenaceae	<i>Verbena macrostachya</i>			C		1/1
plants	higher dicots	Verbenaceae	<i>Verbena africana</i>			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Zygophyllaceae	<i>Tribulus terrestris</i>	caltrop		C		1/1
plants	higher dicots	Zygophyllaceae	<i>Tribulus micrococcus</i>	yellow vine		C		2/2
plants	monocots	Commelinaceae	<i>Commelina ensifolia</i>	scurvy grass		C		2/2
plants	monocots	Cyperaceae	<i>Bulbostylis barbata</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus gilesii</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus clarus</i>			V		1/1
plants	monocots	Cyperaceae	<i>Cyperus bifax</i>	western nutgrass		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus</i>			C		1
plants	monocots	Hypoxidaceae	<i>Hypoxis pratensis var. pratensis</i>			C		1/1
plants	monocots	Laxmanniaceae	<i>Lomandra</i>			C		2
plants	monocots	Poaceae	<i>Eriochloa crebra</i>	spring grass		C		1/1
plants	monocots	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		1
plants	monocots	Poaceae	<i>Triraphis mollis</i>	purple plumegrass		C		1/1
plants	monocots	Poaceae	<i>Astrebla lappacea</i>	curly mitchell grass		C		1/1
plants	monocots	Poaceae	<i>Digitaria brownii</i>			C		3/3
plants	monocots	Poaceae	<i>Eriochloa procera</i>	slender cupgrass		C		3/3
plants	monocots	Poaceae	<i>Aristida latifolia</i>	feathertop wiregrass		C		1/1
plants	monocots	Poaceae	<i>Aristida leptopoda</i>	white speargrass		C		2/2
plants	monocots	Poaceae	<i>Astrebla elymoides</i>	hoop mitchell grass		C		1/1
plants	monocots	Poaceae	<i>Astrebla squarrosa</i>	bull mitchell grass		C		2/1
plants	monocots	Poaceae	<i>Cenchrus echinatus</i>	Mossman River grass	Y			1/1
plants	monocots	Poaceae	<i>Dinebra retroflexa</i>		Y			1/1
plants	monocots	Poaceae	<i>Brachyachne tenella</i>			C		1/1
plants	monocots	Poaceae	<i>Dichanthium setosum</i>			NT	V	1/1
plants	monocots	Poaceae	<i>Enneapogon pallidus</i>	conetop nineawn		C		1/1
plants	monocots	Poaceae	<i>Paspalidium gracile</i>	slender panic		C		2/2
plants	monocots	Poaceae	<i>Bothriochloa pertusa</i>		Y			2/2
plants	monocots	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		1
plants	monocots	Poaceae	<i>Enneapogon truncatus</i>			C		3/3
plants	monocots	Poaceae	<i>Eragrostis tenellula</i>	delicate lovegrass		C		1/1
plants	monocots	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		2
plants	monocots	Poaceae	<i>Iseilema vaginiflorum</i>	red flinders grass		C		4/4
plants	monocots	Poaceae	<i>Sporobolus disjunctus</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida caput-medusae</i>			C		1
plants	monocots	Poaceae	<i>Enneapogon lindleyanus</i>			C		3
plants	monocots	Poaceae	<i>Panicum queenslandicum</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium globoideum</i>	sago grass		C		2/2
plants	monocots	Poaceae	<i>Ancistrachne uncinulata</i>	hooky grass		C		2/1
plants	monocots	Poaceae	<i>Paspalidium breviflorum</i>			C		1/1
plants	monocots	Poaceae	<i>Paspalidium caespitosum</i>	brigalow grass		C		2/2
plants	monocots	Poaceae	<i>Sporobolus actinocladus</i>	katoora grass		C		1/1
plants	monocots	Poaceae	<i>Paspalidium albobillosum</i>			C		1/1
plants	monocots	Poaceae	<i>Digitaria divaricatissima</i>	spreading umbrella grass		C		1/1
plants	monocots	Poaceae	<i>Thyridolepis mitchelliana</i>	mulga mitchell grass		C		1/1
plants	monocots	Poaceae	<i>Dichanthium queenslandicum</i>			V	V	10/10
plants	monocots	Poaceae	<i>Leptochloa panicea subsp. brachiata</i>		Y			1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Dichanthium sericeum subsp. sericeum</i>			C		3/3
plants	monocots	Poaceae	<i>Aristida jerichoensis var. subspinulifera</i>			C		1/1
plants	monocots	Poaceae	<i>Eriachne mucronata forma (Alpha C.E.Hubbard 7882)</i>			C		1/1
plants	monocots	Poaceae	<i>Digitaria orbata</i>			C		1/1
plants	monocots	Poaceae	<i>Setaria surgens</i>			C		1/1
plants	monocots	Poaceae	<i>Setaria italica</i>	foxtail millet	Y			1/1
plants	monocots	Poaceae	<i>Paspalidium</i>			C		4
plants	monocots	Poaceae	<i>Sporobolus</i>			C		3
plants	monocots	Poaceae	<i>Eragrostis</i>			C		3
plants	monocots	Poaceae	<i>Entolasia</i>			C		1
plants	monocots	Poaceae	<i>Poaceae</i>			C		1
plants	monocots	Poaceae	<i>Aristida</i>			C		3

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 23.9978 to 23.5353
Longitude: 148.4992 to 147.9356
Email: hdick@aacrc.net.au
Date submitted: Monday 28 May 2012 16:03:26
Date extracted: Monday 28 May 2012 16:10:20

The number of records retrieved = 865

Disclaimer

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	<i>Rhinella marina</i>	cane toad	Y			4
animals	amphibians	Hylidae	<i>Litoria inermis</i>	bumpy rocketfrog		C		7
animals	amphibians	Hylidae	<i>Litoria peronii</i>	emerald spotted treefrog		C		3/1
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		5/1
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		10/1
animals	amphibians	Hylidae	<i>Cyclorana brevipes</i>	superb collared frog		C		3/2
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		8/1
animals	amphibians	Hylidae	<i>Cyclorana alboguttata</i>	greenstripe frog		C		5
animals	amphibians	Hylidae	<i>Cyclorana novaehollandiae</i>	eastern snapping frog		C		5
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		4
animals	amphibians	Hylidae	<i>Litoria rothii</i>	northern laughing treefrog		C		1
animals	amphibians	Limnodynastidae	<i>Limnodynastes salmini</i>	salmon striped frog		C		2
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		4
animals	amphibians	Limnodynastidae	<i>Limnodynastes tasmaniensis</i>	spotted grassfrog		C		8/1
animals	amphibians	Limnodynastidae	<i>Limnodynastes terraereginae</i>	scarlet sided pobblebonk		C		3
animals	amphibians	Myobatrachidae	<i>Uperoleia rugosa</i>	chubby gungan		C		1
animals	birds	Acanthizidae	<i>Acanthiza nana</i>	yellow thornbill		C		33
animals	birds	Acanthizidae	<i>Gerygone fusca</i>	western gerygone		C		7
animals	birds	Acanthizidae	<i>Smicrornis brevirostris</i>	weebill		C		63
animals	birds	Acanthizidae	<i>Chthonicola sagittata</i>	speckled warbler		C		14
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		7
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren		C		4
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		53
animals	birds	Acanthizidae	<i>Acanthiza reguloides</i>	buff-rumped thornbill		C		10
animals	birds	Acanthizidae	<i>Acanthiza apicalis</i>	inland thornbill		C		34
animals	birds	Acanthizidae	<i>Acanthiza pusilla</i>	brown thornbill		C		1
animals	birds	Acanthizidae	<i>Gerygone mouki</i>	brown gerygone		C		1
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		11
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		34
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk		C		1
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		3
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		C		2
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		67
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		8
animals	birds	Accipitridae	<i>Circus approximans</i>	swamp harrier		C		4
animals	birds	Accipitridae	<i>Pandion cristatus</i>	eastern osprey		C		1
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		25
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		9
animals	birds	Accipitridae	<i>Milvus migrans</i>	black kite		C		23
animals	birds	Acrocephalidae	<i>Acrocephalus australis</i>	Australian reed-warbler		C		7
animals	birds	Aegotheidae	<i>Aegotheles cristatus</i>	Australian owl-nightjar		C		6
animals	birds	Alaudidae	<i>Mirafra javanica</i>	Horsfield's bushlark		C		23
animals	birds	Alcedinidae	<i>Ceyx azureus</i>	azure kingfisher		C		2
animals	birds	Anatidae	<i>Tadorna radjah</i>	radjah shelduck		NT		1
animals	birds	Anatidae	<i>Malacorhynchus membranaceus</i>	pink-eared duck		C		9
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		41

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		13
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		82
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		43
animals	birds	Anatidae	<i>Anas rhynchotis</i>	Australasian shoveler		C		7
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		NT		2
animals	birds	Anatidae	<i>Nettapus pulchellus</i>	green pygmy-goose		C		2
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		5
animals	birds	Anatidae	<i>Dendrocygna eytoni</i>	plumed whistling-duck		C		20
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		62
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		40
animals	birds	Apodidae	<i>Hirundapus caudacutus</i>	white-throated needletail		C		1
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		20
animals	birds	Ardeidae	<i>Ardea modesta</i>	eastern great egret		C		34
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		18
animals	birds	Ardeidae	<i>Ixobrychus dubius</i>	Australian little bittern		C		1
animals	birds	Ardeidae	<i>Ixobrychus flavicollis</i>	black bittern		C		2
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		14
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		26
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		31
animals	birds	Artamidae	<i>Artamus superciliosus</i>	white-browed woodswallow		C		8
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		11
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		34
animals	birds	Artamidae	<i>Strepera graculina</i>	pieb currawong		C		15
animals	birds	Artamidae	<i>Artamus cinereus</i>	black-faced woodswallow		C		8
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		145
animals	birds	Artamidae	<i>Artamus personatus</i>	masked woodswallow		C		9
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pieb butcherbird		C		105
animals	birds	Artamidae	<i>Artamus minor</i>	little woodswallow		C		4
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		5
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		26
animals	birds	Cacatuidae	<i>Calyptorhynchus banksii</i>	red-tailed black-cockatoo		C		4
animals	birds	Cacatuidae	<i>Calyptorhynchus funereus</i>	yellow-tailed black-cockatoo		C		3
animals	birds	Cacatuidae	<i>Nymphicus hollandicus</i>	cockatiel		C		56
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		106
animals	birds	Campephagidae	<i>Lalage sueurii</i>	white-winged triller		C		13
animals	birds	Campephagidae	<i>Coracina maxima</i>	ground cuckoo-shrike		C		14
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		7
animals	birds	Campephagidae	<i>Coracina tenuirostris</i>	cicadabird		C		1
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		59
animals	birds	Casuariidae	<i>Dromaius novaehollandiae</i>	emu		C		12
animals	birds	Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)		C		5
animals	birds	Charadriidae	<i>Pluvialis fulva</i>	Pacific golden plover		C		3
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		13
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		22
animals	birds	Charadriidae	<i>Erythronyx cinctus</i>	red-kneed dotterel		C		2
animals	birds	Charadriidae	<i>Elseyonis melanops</i>	black-fronted dotterel		C		21

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animals	birds	Charadriidae	<i>Vanellus tricolor</i>	banded lapwing		C		3
animals	birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		NT		4
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		31
animals	birds	Climacteridae	<i>Cormobates leucophaea metastasis</i>	white-throated treecreeper (southern)		C		4
animals	birds	Climacteridae	<i>Climacteris picumnus</i>	brown treecreeper		C		2
animals	birds	Columbidae	<i>Phaps chalcoptera</i>	common bronzewing		C		18
animals	birds	Columbidae	<i>Geopelia cuneata</i>	diamond dove		C		8
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		55
animals	birds	Columbidae	<i>Streptopelia chinensis</i>	spotted dove	Y			1
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		35
animals	birds	Columbidae	<i>Columba livia</i>	rock dove	Y			1
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		60
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		19
animals	birds	Corcoracidae	<i>Corcorax melanorhamphos</i>	white-winged chough		C		13
animals	birds	Corcoracidae	<i>Struthidea cinerea</i>	apostlebird		C		43
animals	birds	Corvidae	<i>Corvus bennetti</i>	little crow		C		6
animals	birds	Corvidae	<i>Corvus coronoides</i>	Australian raven		C		36
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		54
animals	birds	Corvidae	<i>Corvus sp.</i>					60
animals	birds	Cuculidae	<i>Cacomantis variolosus</i>	brush cuckoo		C		2/1
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		14
animals	birds	Cuculidae	<i>Chalcites minutillius minutillius</i>	little bronze-cuckoo		C		2/1
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		10
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		41
animals	birds	Cuculidae	<i>Chalcites basalus</i>	Horsfield's bronze-cuckoo		C		2
animals	birds	Cuculidae	<i>Chalcites lucidus</i>	shining bronze-cuckoo		C		8
animals	birds	Cuculidae	<i>Chalcites osculans</i>	black-eared cuckoo		C		3
animals	birds	Cuculidae	<i>Cacomantis pallidus</i>	pallid cuckoo		C		7
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		8
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		7
animals	birds	Estrildidae	<i>Neochmia modesta</i>	plum-headed finch		C		3
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		11
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		82
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		57
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		2
animals	birds	Falconidae	<i>Falco subniger</i>	black falcon		C		3
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		46
animals	birds	Falconidae	<i>Falco longipennis</i>	Australian hobby		C		9
animals	birds	Gruidae	<i>Grus rubicunda</i>	brulga		C		35
animals	birds	Halcyonidae	<i>Todiramphus pyrrhopygius</i>	red-backed kingfisher		C		5
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		3
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		17
animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		5
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		73
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		19
animals	birds	Hirundinidae	<i>Petrochelidon ariel</i>	fairy martin		C		11

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animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		21
animals	birds	Jacanidae	<i>Irediparra gallinacea</i>	comb-crested jacana		C		4
animals	birds	Laridae	<i>Chlidonias hybrida</i>	whiskered tern		C		9
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		C		22
animals	birds	Laridae	<i>Gelochelidon nilotica</i>	gull-billed tern		C		3
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		34
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		74
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		40
animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		33
animals	birds	Megaluridae	<i>Megalurus gramineus</i>	little grassbird		C		1
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		4
animals	birds	Megaluridae	<i>Cincloramphus cruralis</i>	brown songlark		C		8
animals	birds	Megaluridae	<i>Cincloramphus mathewsi</i>	rufous songlark		C		8
animals	birds	Megapodiidae	<i>Alectura lathamii</i>	Australian brush-turkey		C		3
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		40
animals	birds	Meliphagidae	<i>Melithreptus brevirostris</i>	brown-headed honeyeater		C		1
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		35
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		37
animals	birds	Meliphagidae	<i>Acanthagenys rufogularis</i>	spiny-cheeked honeyeater		C		16
animals	birds	Meliphagidae	<i>Ptilotula penicillatus</i>	white-plumed honeyeater		C		1
animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		8
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		6
animals	birds	Meliphagidae	<i>Manorina flavigula</i>	yellow-throated miner		C		61
animals	birds	Meliphagidae	<i>Gavicalis virescens</i>	singing honeyeater		C		41
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		30
animals	birds	Meliphagidae	<i>Melithreptus gularis</i>	black-chinned honeyeater		NT		1
animals	birds	Meliphagidae	<i>Melithreptus lunatus</i>	white-naped honeyeater		C		1
animals	birds	Meliphagidae	<i>Nesoptilotis leucotis</i>	white-eared honeyeater		C		12
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		50
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		29
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		46
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		33
animals	birds	Monarchidae	<i>Myiagra inquieta</i>	restless flycatcher		C		11
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		24
animals	birds	Monarchidae	<i>Myiagra cyanoleuca</i>	satin flycatcher		C		7
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		70
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		13
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		42
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		6
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		25
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		7
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		31
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		37
animals	birds	Pachycephalidae	<i>Pachycephala pectoralis</i>	golden whistler		C		10
animals	birds	Pachycephalidae	<i>Colluricincla megarhyncha</i>	little shrike-thrush		C		1
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		91

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animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		96
animals	birds	Pardalotidae	<i>Pardalotus rubricatus</i>	red-browed pardalote		C		1
animals	birds	Pardalotidae	<i>Pardalotus punctatus</i>	spotted pardalote		C		1
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			3
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		41
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		14
animals	birds	Petroicidae	<i>Petroica goodenovii</i>	red-capped robin		C		6
animals	birds	Petroicidae	<i>Microeca fascinans</i>	jacky winter		C		10
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		40
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		30
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		27
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		18
animals	birds	Phasianidae	<i>Coturnix pectoralis</i>	stubble quail		C		6
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		9
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		12
animals	birds	Podicipedidae	<i>Poliocephalus poliocephalus</i>	hoary-headed grebe		C		2
animals	birds	Podicipedidae	<i>Podiceps cristatus</i>	great crested grebe		C		16
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		47
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		36
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		49
animals	birds	Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		62
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		2
animals	birds	Psittacidae	<i>Alisterus scapularis</i>	Australian king-parrot		C		1
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		76
animals	birds	Psittacidae	<i>Melopsittacus undulatus</i>	budgerigar		C		2
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	spotted bowerbird		C		43
animals	birds	Rallidae	<i>Fulica atra</i>	Eurasian coot		C		26
animals	birds	Rallidae	<i>Porzana pusilla</i>	Baillon's crane		C		2/2
animals	birds	Rallidae	<i>Tribonyx ventralis</i>	black-tailed native-hen		C		3
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		20
animals	birds	Rallidae	<i>Porphyrio porphyrio</i>	purple swamphen		C		9
animals	birds	Recurvirostridae	<i>Himantopus himantopus</i>	black-winged stilt		C		19
animals	birds	Recurvirostridae	<i>Recurvirostra novaehollandiae</i>	red-necked avocet		C		1
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		91
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		80
animals	birds	Rhipiduridae	<i>Rhipidura rufifrons</i>	rufous fantail		C		1
animals	birds	Rostratulidae	<i>Rostratula australis</i>	Australian painted snipe		V	V	4
animals	birds	Scolopacidae	<i>Limosa lapponica</i>	bar-tailed godwit		C		1
animals	birds	Scolopacidae	<i>Tringa nebularia</i>	common greenshank		C		1
animals	birds	Scolopacidae	<i>Arenaria interpres</i>	ruddy turnstone		C		2
animals	birds	Scolopacidae	<i>Calidris acuminata</i>	sharp-tailed sandpiper		C		6
animals	birds	Scolopacidae	<i>Calidris ferruginea</i>	curlew sandpiper		C		2
animals	birds	Scolopacidae	<i>Calidris ruficollis</i>	red-necked stint		C		4
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		12
animals	birds	Strigidae	<i>Ninox connivens</i>	barking owl		C		2
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		15

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animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		18
animals	birds	Threskiornithidae	<i>Plegadis falcinellus</i>	glossy ibis		C		7
animals	birds	Threskiornithidae	<i>Platalea flavipes</i>	yellow-billed spoonbill		C		14
animals	birds	Threskiornithidae	<i>Platalea regia</i>	royal spoonbill		C		19
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		10
animals	birds	Turnicidae	<i>Turnix pyrrhоторax</i>	red-chested button-quail		C		5
animals	birds	Turnicidae	<i>Turnix velox</i>	little button-quail		C		3
animals	birds	Tytonidae	<i>Tyto javanica</i>	eastern barn owl		C		14
animals	bony fish	Ambassidae	<i>Ambassis agassizii</i>	Agassiz's glassfish				3
animals	bony fish	Atherinidae	<i>Craterocephalus stercusmuscarum</i>	flyspecked hardyhead				3
animals	bony fish	Clupeidae	<i>Nematalosa erebi</i>	bony bream				3
animals	bony fish	Eleotridae	<i>Hypseleotris klunzingeri</i>	western carp gudgeon				3
animals	bony fish	Eleotridae	<i>Philypnodon grandiceps</i>	flathead gudgeon				2
animals	bony fish	Eleotridae	<i>Hypseleotris species 1</i>	Midgley's carp gudgeon				1
animals	bony fish	Eleotridae	<i>Oxyeleotris lineolata</i>	sleepy cod				2
animals	bony fish	Melanotaeniidae	<i>Melanotaenia splendida splendida</i>	eastern rainbowfish				3
animals	bony fish	Osteoglossidae	<i>Scleropages leichardti</i>	southern saratoga				2
animals	bony fish	Percichthyidae	<i>Maccullochella peelii</i>	Murray cod			V	1
animals	bony fish	Percichthyidae	<i>Macquaria ambigua</i>	golden perch				4/1
animals	bony fish	Plotosidae	<i>Tandanus tandanus</i>	freshwater catfish				3
animals	bony fish	Plotosidae	<i>Neosilurus hyrtl</i>	Hyrtl's catfish				2
animals	bony fish	Terapontidae	<i>Scortum hillii</i>	leathery grunter				3
animals	bony fish	Terapontidae	<i>Leiopotherapon unicolor</i>	spangled perch				2
animals	bony fish	Terapontidae	<i>Amniataba percoides</i>	barred grunter				1
animals	bony fish	Terapontidae	<i>Bidyanus bidyanus</i>	silver perch				1
animals	insects	Nymphalidae	<i>Euploea core corinna</i>	common crow				1
animals	mammals	Canidae	<i>Canis lupus dingo</i>	dingo				2
animals	mammals	Canidae	<i>Vulpes vulpes</i>	red fox	Y			1
animals	mammals	Dasyuridae	<i>Dasyurus hallucatus</i>	northern quoll		C	E	2
animals	mammals	Dasyuridae	<i>Sminthopsis macroura</i>	stripe-faced dunnart		C		1/1
animals	mammals	Dasyuridae	<i>Planigale maculata</i>	common planigale		C		2
animals	mammals	Dasyuridae	<i>Planigale ingrami</i>	long-tailed planigale		C		1/1
animals	mammals	Emballonuridae	<i>Taphozous troughtoni</i>	Troughton's sheath-tail bat		C		471
animals	mammals	Emballonuridae	<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail bat		C		3
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			10
animals	mammals	Leporidae	<i>Oryctolagus cuniculus</i>	rabbit	Y			7
animals	mammals	Macropodidae	<i>Lagorchestes conspicillatus</i>	spectacled hare-wallaby		C		8
animals	mammals	Macropodidae	<i>Onychogalea fraenata</i>	bridled nailtail wallaby		E	E	1
animals	mammals	Macropodidae	<i>Petrogale herberti</i>	Herbert's rock-wallaby		C		2
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		12
animals	mammals	Macropodidae	<i>Macropus robustus</i>	common wallaroo		C		9
animals	mammals	Macropodidae	<i>Macropus dorsalis</i>	black-striped wallaby		C		4
animals	mammals	Macropodidae	<i>Wallabia bicolor</i>	swamp wallaby		C		9
animals	mammals	Molossidae	<i>Mormopterus sp.</i>					1/1
animals	mammals	Molossidae	<i>Tadarida australis</i>	white-striped freetail bat		C		1
animals	mammals	Molossidae	<i>Mormopterus beccarii</i>	Beccari's freetail bat		C		1/1

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animals	mammals	Molossidae	<i>Mormopterus planiceps</i>	southern freetail bat		C		1
animals	mammals	Muridae	<i>Pseudomys gracilicaudatus</i>	eastern chestnut mouse		C		8/1
animals	mammals	Muridae	<i>Rattus sp. cf. villosissimus/sordidus</i>			C		4
animals	mammals	Muridae	<i>Pseudomys delicatulus</i>	delicate mouse		C		9/1
animals	mammals	Muridae	<i>Hydromys chrysogaster</i>	water rat		C		1
animals	mammals	Muridae	<i>Pseudomys desertor</i>	desert mouse		C		3
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat		C		4/1
animals	mammals	Muridae	<i>Leggadina forresti</i>	Forrest's mouse		C		1
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			22
animals	mammals	Peramelidae	<i>Isodon macrourus</i>	northern brown bandicoot		C		2
animals	mammals	Peramelidae	<i>Perameles nasuta</i>	long-nosed bandicoot		C		1/1
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider		C		2
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		12
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		C	V	22
animals	mammals	Potoroidae	<i>Aepyprymnus rufescens</i>	rufous bettong		C		5
animals	mammals	Pteropodidae	<i>Pteropus scapulatus</i>	little red flying-fox		C		5
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			3
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		C		14
animals	mammals	Vespertilionidae	<i>Chalinolobus picatus</i>	little pied bat		NT		1
animals	mammals	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's wattled bat		C		3/2
animals	mammals	Vespertilionidae	<i>Vespadelus pumilus</i>	eastern forest bat		C		2/1
animals	mammals	Vespertilionidae	<i>Scotorepens balstoni</i>	inland broad-nosed bat		C		1
animals	mammals	Vespertilionidae	<i>Nyctophilus gouldi</i>	Gould's long-eared bat		C		1/1
animals	mammals	Vespertilionidae	<i>Scotorepens greyii</i>	little broad-nosed bat		C		1
animals	mammals	Vespertilionidae	<i>Miniopterus schreibersii oceanensis</i>	eastern bent-wing bat		C		1/1
animals	reptiles	Agamidae	<i>Amphibolurus nobbi</i>			C		1/1
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		1
animals	reptiles	Agamidae	<i>Amphibolurus gilberti</i>	Gilbert's dragon		C		3/2
animals	reptiles	Boidae	<i>Antaresia maculosa</i>	spotted python		C		2
animals	reptiles	Boidae	<i>Aspidites melanocephalus</i>	black-headed python		C		3/1
animals	reptiles	Carphodactylidae	<i>Nephrurus asper</i>	spiny knob-tailed gecko		C		3
animals	reptiles	Chelidae	<i>Emydura macquarii krefftii</i>	Krefft's river turtle		C		5/1
animals	reptiles	Chelidae	<i>Chelodina expansa</i>	broad-shelled river turtle		C		1
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		2
animals	reptiles	Colubridae	<i>Dendrelaphis punctulata</i>	common tree snake		C		2
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		1/1
animals	reptiles	Diplodactylidae	<i>Diplodactylus conspicillatus</i>	fat-tailed diplodactylus		C		1
animals	reptiles	Diplodactylidae	<i>Lucasium steindachneri</i>	Steindachner's gecko		C		3/1
animals	reptiles	Diplodactylidae	<i>Diplodactylus vittatus</i>	wood gecko		C		3/1
animals	reptiles	Diplodactylidae	<i>Strophurus taenicauda</i>	golden-tailed gecko		NT		4
animals	reptiles	Diplodactylidae	<i>Oedura marmorata</i>	marbled velvet gecko		C		1/1
animals	reptiles	Diplodactylidae	<i>Oedura monilis</i>			C		6/3
animals	reptiles	Elapidae	<i>Furina diadema</i>	red-naped snake		C		2/2
animals	reptiles	Elapidae	<i>Suta suta</i>	myall snake		C		3/1
animals	reptiles	Elapidae	<i>Denisonia maculata</i>	ornamental snake		V	V	2/1
animals	reptiles	Elapidae	<i>Cryptophis boschmai</i>	Carpentaria whip snake		C		4/2

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animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		4
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		6
animals	reptiles	Elapidae	<i>Vermicella annulata</i>	bandy-bandy		C		2/1
animals	reptiles	Elapidae	<i>Pseudechis australis</i>	king brown snake		C		4
animals	reptiles	Elapidae	<i>Acanthophis antarcticus</i>	common death adder		NT		2
animals	reptiles	Elapidae	<i>Brachyurops australis</i>	coral snake		C		1
animals	reptiles	Elapidae	<i>Hoplocephalus bitorquatus</i>	pale-headed snake		C		4/3
animals	reptiles	Elapidae	<i>Hemiaspis damelii</i>	grey snake		E		1
animals	reptiles	Gekkonidae	<i>Gehyra catenata</i>			C		1
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>			C		3/1
animals	reptiles	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's gecko		C		10/3
animals	reptiles	Gekkonidae	<i>Gehyra variegata</i>	tree dtella		C		1
animals	reptiles	Pygopodidae	<i>Pygopus schraderi</i>			C		1/1
animals	reptiles	Pygopodidae	<i>Lialis burtonis</i>	Burton's legless lizard		C		4/1
animals	reptiles	Pygopodidae	<i>Delma tincta</i>			C		1/1
animals	reptiles	Scincidae	<i>Ctenotus strauchii</i>			C		2/1
animals	reptiles	Scincidae	<i>Carlia pectoralis</i>			C		8/4
animals	reptiles	Scincidae	<i>Lygisaurus foliorum</i>			C		1
animals	reptiles	Scincidae	<i>Morethia boulengeri</i>			C		6/1
animals	reptiles	Scincidae	<i>Ctenotus taeniolatus</i>	copper-tailed skink		C		4/1
animals	reptiles	Scincidae	<i>Lampropholis delicata</i>			C		1
animals	reptiles	Scincidae	<i>Morethia taeniopleura</i>	fire-tailed skink		C		1
animals	reptiles	Scincidae	<i>Tiliqua rugosa aspera</i>	shingle-back (eastern subspecies)		C		2
animals	reptiles	Scincidae	<i>Lerista punctatovittata</i>			C		2/1
animals	reptiles	Scincidae	<i>Cryptoblepharus pannosus</i>	ragged snake-eyed skink		C		5/2
animals	reptiles	Scincidae	<i>Eremiascincus fasciolatus</i>	narrow-banded sand swimmer		C		2
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		8/1
animals	reptiles	Scincidae	<i>Ctenotus robustus</i>			C		5/1
animals	reptiles	Scincidae	<i>Egernia striolata</i>	tree skink		C		2
animals	reptiles	Scincidae	<i>Carlia munda</i>			C		2
animals	reptiles	Scincidae	<i>Menetia greyii</i>			C		3/1
animals	reptiles	Scincidae	<i>Lerista fragilis</i>			C		5/2
animals	reptiles	Scincidae	<i>Ctenotus ingrami</i>			C		1/1
animals	reptiles	Scincidae	<i>Menetia timlowi</i>			C		2
animals	reptiles	Typhlopidae	<i>Ramphotyphlops ligatus</i>			C		1/1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops sp.</i>					1
animals	reptiles	Varanidae	<i>Varanus tristis</i>	black-tailed monitor		C		3
animals	reptiles	Varanidae	<i>Varanus gouldii</i>	sand monitor		C		9/1
animals	reptiles	Varanidae	<i>Varanus varius</i>	lace monitor		C		1
plants	conifers	Cupressaceae	<i>Callitris columellaris</i>			C		1
plants	conifers	Cupressaceae	<i>Callitris</i>			C		1
plants	conifers	Cupressaceae	<i>Callitris glaucophylla</i>	white cypress pine		C		1/1
plants	ferns	Adiantaceae	<i>Pellaea nana</i>			C		1/1
plants	ferns	Adiantaceae	<i>Adiantum hispidulum var. hypoglaucum</i>			C		1/1
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi subsp. sieberi</i>			C		1/1
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi</i>			C		11

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plants	ferns	Adiantaceae	<i>Cheilanthes distans</i>	bristly cloak fern		C		1/1
plants	ferns	Blechnaceae	<i>Doodia caudata</i>			C		1/1
plants	ferns	Marsileaceae	<i>Marsilea hirsuta</i>	hairy nardoo		C		1
plants	ferns	Marsileaceae	<i>Marsilea drummondii</i>	common nardoo		C		1
plants	higher dicots	Acanthaceae	<i>Pseuderanthemum variabile</i>	pastel flower		C		3/1
plants	higher dicots	Acanthaceae	<i>Rostellularia adscendens</i>			C		4
plants	higher dicots	Acanthaceae	<i>Brunoniella australis</i>	blue trumpet		C		2
plants	higher dicots	Aizoaceae	<i>Trianthema triquetra</i>	red spinach		C		1
plants	higher dicots	Amaranthaceae	<i>Alternanthera denticulata</i>	lesser joyweed		C		2/1
plants	higher dicots	Amaranthaceae	<i>Alternanthera nodiflora</i>	joyweed		C		1/1
plants	higher dicots	Amaranthaceae	<i>Achyranthes aspera</i>			C		3
plants	higher dicots	Amaranthaceae	<i>Nyssanthes erecta</i>			C		2/1
plants	higher dicots	Amaranthaceae	<i>Guilleminea densa</i>	small matweed	Y			1/1
plants	higher dicots	Anacardiaceae	<i>Schinus terebinthifolius</i>		Y			1/1
plants	higher dicots	Apiaceae	<i>Eryngium plantagineum</i>	long eryngium		C		1/1
plants	higher dicots	Apocynaceae	<i>Parsonsia eucalyptophylla</i>	gargaloo		C		4/1
plants	higher dicots	Apocynaceae	<i>Sarcostemma viminale subsp. australe</i>			C		1
plants	higher dicots	Apocynaceae	<i>Parsonsia lanceolata</i>	northern silkpod		C		4/1
plants	higher dicots	Apocynaceae	<i>Marsdenia microlepis</i>			C		1/1
plants	higher dicots	Apocynaceae	<i>Marsdenia brevifolia</i>			V	V	1/1
plants	higher dicots	Apocynaceae	<i>Parsonsia straminea</i>	monkey rope		C		2
plants	higher dicots	Apocynaceae	<i>Alstonia constricta</i>	bitterbark		C		9/1
plants	higher dicots	Apocynaceae	<i>Secamone elliptica</i>			C		2
plants	higher dicots	Apocynaceae	<i>Carissa lanceolata</i>			C		1
plants	higher dicots	Apocynaceae	<i>Alyxia ruscifolia</i>			C		3/3
plants	higher dicots	Apocynaceae	<i>Carissa ovata</i>	currantbush		C		16/1
plants	higher dicots	Apocynaceae	<i>Parsonsia</i>			C		1
plants	higher dicots	Apocynaceae	<i>Marsdenia</i>			C		1
plants	higher dicots	Asteraceae	<i>Peripleura hispidula var. hispidula</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Vittadinia dissecta</i>			C		1
plants	higher dicots	Asteraceae	<i>Pterocaulon serrulatum var. serrulatum</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Euchiton sphaericus</i>			C		1
plants	higher dicots	Asteraceae	<i>Asteraceae</i>			C		1
plants	higher dicots	Asteraceae	<i>Cassinia laevis</i>			C		2
plants	higher dicots	Asteraceae	<i>Olearia canescens</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Sonchus oleraceus</i>	common sowthistle	Y			1/1
plants	higher dicots	Asteraceae	<i>Tridax procumbens</i>	tridax daisy	Y			2/2
plants	higher dicots	Asteraceae	<i>Calotis cuneifolia</i>	burr daisy		C		4/1
plants	higher dicots	Asteraceae	<i>Centipeda racemosa</i>	snuffweed		C		1/1
plants	higher dicots	Asteraceae	<i>Conyza bonariensis</i>		Y			2/2
plants	higher dicots	Asteraceae	<i>Cymbonotus maidenii</i>			E		1/1
plants	higher dicots	Asteraceae	<i>Vittadinia dissecta var. dissecta</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Crassocephalum crepidioides</i>	thickhead	Y			1/1
plants	higher dicots	Asteraceae	<i>Parthenium hysterophorus</i>	parthenium weed	Y			3/1
plants	higher dicots	Asteraceae	<i>Ozothamnus cassinioides</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Pterocaulon serrulatum</i>			C		4

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plants	higher dicots	Asteraceae	<i>Wedelia spilanthis</i>			C		1
plants	higher dicots	Asteraceae	<i>Verbesina encelioides</i>	crownbeard	Y			2/1
plants	higher dicots	Asteraceae	<i>Leiocarpa brevicompta</i>			C		2/2
plants	higher dicots	Asteraceae	<i>Cyanthillium cinereum</i>			C		7
plants	higher dicots	Asteraceae	<i>Pterocaulon redolens</i>			C		3/1
plants	higher dicots	Asteraceae	<i>Peripleura hispidula</i>			C		1
plants	higher dicots	Asteraceae	<i>Acmella grandiflora</i> var. <i>brachyglossa</i>			C		1
plants	higher dicots	Bignoniaceae	<i>Pandorea pandorana</i>	wonga vine		C		4/2
plants	higher dicots	Boraginaceae	<i>Ehretia membranifolia</i>	weeping koda		C		1
plants	higher dicots	Brassicaceae	<i>Sisymbrium thellungii</i>	African turnip-weed	Y			1/1
plants	higher dicots	Cactaceae	<i>Opuntia stricta</i>		Y			2
plants	higher dicots	Cactaceae	<i>Opuntia</i>		Y			2
plants	higher dicots	Cactaceae	<i>Opuntia tomentosa</i>	velvety tree pear	Y			6
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum hookeri</i>	Queensland ebony		C		4
plants	higher dicots	Caesalpiniaceae	<i>Senna artemisioides</i> subsp. <i>coriacea</i>			C		1
plants	higher dicots	Caesalpiniaceae	<i>Parkinsonia aculeata</i>	Jerusalem thorn	Y			3/1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum carronii</i>	ebony tree		C		4
plants	higher dicots	Caesalpiniaceae	<i>Senna barclayana</i>			C		2
plants	higher dicots	Caesalpiniaceae	<i>Cassia brewsteri</i>			C		3
plants	higher dicots	Campanulaceae	<i>Wahlenbergia islensis</i>			NT		2/1
plants	higher dicots	Capparaceae	<i>Capparis mitchellii</i>			C		1
plants	higher dicots	Capparaceae	<i>Apophyllum anomalum</i>	broom bush		C		4/1
plants	higher dicots	Capparaceae	<i>Capparis lasiantha</i>	nipan		C		9/1
plants	higher dicots	Capparaceae	<i>Capparis loranthifolia</i> var. <i>loranthifolia</i>			C		1/1
plants	higher dicots	Capparaceae	<i>Capparis arborea</i>	brush caper berry		C		1
plants	higher dicots	Capparaceae	<i>Capparis</i>			C		1
plants	higher dicots	Capparaceae	<i>Capparis loranthifolia</i>			C		1
plants	higher dicots	Capparaceae	<i>Capparis canescens</i>			C		1
plants	higher dicots	Casuarinaceae	<i>Casuarina cunninghamiana</i>			C		2
plants	higher dicots	Casuarinaceae	<i>Casuarina cristata</i>	belah		C		2
plants	higher dicots	Celastraceae	<i>Maytenus cunninghamii</i>	yellow berry bush		C		1
plants	higher dicots	Celastraceae	<i>Elaeodendron australe</i>			C		1
plants	higher dicots	Celastraceae	<i>Denhamia pittosporoides</i>			C		1
plants	higher dicots	Celastraceae	<i>Denhamia oleaster</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Einadia</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Atriplex</i>			C		3
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Dysphania glomulifera</i> subsp. <i>glomulifera</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena muricata</i> var. <i>muricata</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena muricata</i> var. <i>villosa</i>			C		2/2
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena bicornis</i> var. <i>horrida</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena calcarata</i>	red burr		C		1
plants	higher dicots	Chenopodiaceae	<i>Salsola kali</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Maireana microphylla</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Chenopodium carinatum</i>	green crumbweed		C		1/1
plants	higher dicots	Chenopodiaceae	<i>Einadia hastata</i>			C		1

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plants	higher dicots	Chenopodiaceae	<i>Atriplex muelleri</i>	lagoon saltbush		C		1/1
plants	higher dicots	Chenopodiaceae	<i>Atriplex nummularia</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena birchii</i>	galvanised burr		C		1
plants	higher dicots	Chenopodiaceae	<i>Enchylaena tomentosa</i>			C		3
plants	higher dicots	Combretaceae	<i>Macropteranthes leichhardtii</i>	bonewood		C		2
plants	higher dicots	Combretaceae	<i>Terminalia oblongata</i>			C		7
plants	higher dicots	Convolvulaceae	<i>Ipomoea plebeia</i>	bellvine		C		1/1
plants	higher dicots	Convolvulaceae	<i>Polymeria pusilla</i>			C		2/2
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i>			C		1
plants	higher dicots	Convolvulaceae	<i>Ipomoea lonchophylla</i>			C		2/1
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>decumbens</i>			C		1/1
plants	higher dicots	Ebenaceae	<i>Diospyros humilis</i>	small-leaved ebony		C		3/1
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum australe</i>	cocaine tree		C		6/2
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum</i> sp. (Splityard Creek L.Pedley 5360)			C		9
plants	higher dicots	Euphorbiaceae	<i>Croton insularis</i>	Queensland cascarilla		C		1
plants	higher dicots	Euphorbiaceae	<i>Acalypha eremorum</i>	soft acalypha		C		1
plants	higher dicots	Euphorbiaceae	<i>Acalypha australis</i>		Y			1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia stevenii</i>	bottle tree spurge		C		1/1
plants	higher dicots	Euphorbiaceae	<i>Croton phebaloides</i>	narrow-leaved croton		C		2
plants	higher dicots	Euphorbiaceae	<i>Bertya opposens</i>			C	V	4/2
plants	higher dicots	Euphorbiaceae	<i>Euphorbia hyssopifolia</i>		Y			1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia coghlanii</i>			C		2/2
plants	higher dicots	Euphorbiaceae	<i>Beyeria viscosa</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Desmodium</i>			C		2
plants	higher dicots	Fabaceae	<i>Indigofera</i> sp. (Aramac E.J.Thompson+ JER177)			C		1/1
plants	higher dicots	Fabaceae	<i>Hovea longipes</i>	brush hovea		C		1
plants	higher dicots	Fabaceae	<i>Glycine falcata</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Lotus australis</i>	Australian trefoil		C		1/1
plants	higher dicots	Fabaceae	<i>Vigna suberecta</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Desmodium gunnii</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Hovea lanceolata</i>			C		2
plants	higher dicots	Fabaceae	<i>Hovea parvicalyx</i>			C		4/4
plants	higher dicots	Fabaceae	<i>Tephrosia rufula</i>			C		1
plants	higher dicots	Fabaceae	<i>Glycine cyrtoloba</i>			C		2
plants	higher dicots	Fabaceae	<i>Glycine tomentella</i>	woolly glycine		C		1
plants	higher dicots	Fabaceae	<i>Stylosanthes scabra</i>		Y			2
plants	higher dicots	Fabaceae	<i>Desmodium brachypodium</i>	large ticktrefoil		C		1
plants	higher dicots	Fabaceae	<i>Crotalaria medicaginea</i>	trefoil rattlepod		C		1
plants	higher dicots	Fabaceae	<i>Vigna radiata</i> var. <i>sublobata</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Galactia tenuiflora</i> var. <i>lucida</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Rhynchosia minima</i> var. <i>australis</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Tephrosia filipes</i> subsp. <i>filipes</i>			C		1
plants	higher dicots	Fabaceae	<i>Zornia muriculata</i> subsp. <i>angustata</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Indigofera</i>			C		1
plants	higher dicots	Goodeniaceae	<i>Goodenia</i>			C		1/1
plants	higher dicots	Goodeniaceae	<i>Goodenia fascicularis</i>			C		1/1

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plants	higher dicots	Goodeniaceae	<i>Goodenia grandiflora</i>			C		3/1
plants	higher dicots	Goodeniaceae	<i>Brunonia australis</i>	blue pincushion		C		1
plants	higher dicots	Haloragaceae	<i>Haloragis aspera</i>	raspweed		C		2/1
plants	higher dicots	Lamiaceae	<i>Clerodendrum floribundum</i>			C		2/1
plants	higher dicots	Lamiaceae	<i>Teucrium integrifolium</i>			C		3/2
plants	higher dicots	Lamiaceae	<i>Basilicum polystachyon</i>			C		1/1
plants	higher dicots	Lamiaceae	<i>Anisomeles malabarica</i>			C		1/1
plants	higher dicots	Lamiaceae	<i>Plectranthus parviflorus</i>			C		1
plants	higher dicots	Loganiaceae	<i>Mitrasacme pygmaea</i>			C		1/1
plants	higher dicots	Loranthaceae	<i>Amyema quandang var. quandang</i>			C		2/1
plants	higher dicots	Loranthaceae	<i>Dendrophthoe glabrescens</i>			C		1
plants	higher dicots	Loranthaceae	<i>Lysiana subfalcata</i>			C		1/1
plants	higher dicots	Loranthaceae	<i>Amyema maidenii</i>			C		1
plants	higher dicots	Loranthaceae	<i>Amyema quandang var. bancroftii</i>	broad-leaved grey mistletoe		C		1/1
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum</i>			C		1
plants	higher dicots	Malvaceae	<i>Abutilon tubulosum</i>			C		1
plants	higher dicots	Malvaceae	<i>Hibiscus verdcourtii</i>			C		2/2
plants	higher dicots	Malvaceae	<i>Abelmoschus ficulneus</i>	native rosella		C		1/1
plants	higher dicots	Malvaceae	<i>Hibiscus krichauffianus</i>			C		4/1
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum var. incanum</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum var. oxycarpum</i>			C		3/2
plants	higher dicots	Malvaceae	<i>Hibiscus sturtii var. campylocllamys</i>			C		2/1
plants	higher dicots	Malvaceae	<i>Malvastrum americanum var. americanum</i>		Y			3
plants	higher dicots	Malvaceae	<i>Hibiscus sp. (Emerald S.L.Everist 2124)</i>			C		1
plants	higher dicots	Malvaceae	<i>Sida</i>			C		6
plants	higher dicots	Malvaceae	<i>Abutilon</i>			C		1
plants	higher dicots	Malvaceae	<i>Hibiscus</i>			C		4/1
plants	higher dicots	Malvaceae	<i>Malvaceae</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Sida spinosa</i>	spiny sida	Y			1/1
plants	higher dicots	Malvaceae	<i>Sida pleiantha</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Abutilon nobile</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Sida cordifolia</i>		Y			1
plants	higher dicots	Malvaceae	<i>Sida fibulifera</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Sida filiformis</i>			C		8
plants	higher dicots	Malvaceae	<i>Sida trichopoda</i>			C		1
plants	higher dicots	Malvaceae	<i>Abutilon auritum</i>	Chinese lantern		C		1
plants	higher dicots	Malvaceae	<i>Hibiscus sturtii</i>			C		5
plants	higher dicots	Malvaceae	<i>Sida atherophora</i>			C		6/1
plants	higher dicots	Malvaceae	<i>Abutilon guineense</i>			C		1/1
plants	higher dicots	Meliaceae	<i>Owenia acidula</i>	emu apple		C		3/2
plants	higher dicots	Meliaceae	<i>Melia azedarach</i>	white cedar		C		1
plants	higher dicots	Meliaceae	<i>Turraea pubescens</i>	native honeysuckle		C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia burrowii</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia oswaldii</i>	miljee		C		1
plants	higher dicots	Mimosaceae	<i>Acacia salicina</i>	doolan		C		7/3
plants	higher dicots	Mimosaceae	<i>Acacia shirleyi</i>	lancewood		C		10/1

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plants	higher dicots	Mimosaceae	<i>Acacia fodinalis</i>			C		3
plants	higher dicots	Mimosaceae	<i>Acacia leiocalyx</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia victoriae</i>			C		3/3
plants	higher dicots	Mimosaceae	<i>Acacia catenulata</i>	bendee		C		3/1
plants	higher dicots	Mimosaceae	<i>Acacia farnesiana</i>	mimosa bush		C		1
plants	higher dicots	Mimosaceae	<i>Acacia harpophylla</i>	brigalow		C		9
plants	higher dicots	Mimosaceae	<i>Acacia holosericea</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia leptostachya</i>	Townsville wattle		C		1
plants	higher dicots	Mimosaceae	<i>Acacia longispicata</i>			C		2/2
plants	higher dicots	Mimosaceae	<i>Acacia bancroftiorum</i>			C		2
plants	higher dicots	Mimosaceae	<i>Acacia fasciculifera</i>	scaly bark		C		1
plants	higher dicots	Mimosaceae	<i>Archidendropsis basaltica</i>	red lancewood		C		2
plants	higher dicots	Mimosaceae	<i>Acacia cretata</i> x <i>A.fodinalis</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i> subsp. <i>excelsa</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia</i> sp. (Comet L.Pedley 4091)			C		1/1
plants	higher dicots	Mimosaceae	<i>Neptunia gracilis</i> forma <i>gracilis</i>			C		2/1
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i>			C		3
plants	higher dicots	Mimosaceae	<i>Acacia angusta</i>			C		2/2
plants	higher dicots	Mimosaceae	<i>Acacia decora</i>	pretty wattle		C		1
plants	higher dicots	Mimosaceae	<i>Acacia</i>			C		1
plants	higher dicots	Molluginaceae	<i>Glinus lotoides</i>	hairy carpet weed		C		1/1
plants	higher dicots	Moraceae	<i>Ficus opposita</i>			C		2/2
plants	higher dicots	Moraceae	<i>Ficus virens</i> var. <i>sublanceolata</i>			C		2/2
plants	higher dicots	Moraceae	<i>Ficus rubiginosa</i> forma <i>rubiginosa</i>			C		1/1
plants	higher dicots	Moraceae	<i>Ficus</i>			C		1
plants	higher dicots	Moraceae	<i>Ficus coronata</i>	creek sandpaper fig		C		1
plants	higher dicots	Myoporaceae	<i>Myoporum acuminatum</i>	coastal boobialla		C		4
plants	higher dicots	Myoporaceae	<i>Eremophila maculata</i>			C		1
plants	higher dicots	Myoporaceae	<i>Eremophila debilis</i>	winter apple		C		1/1
plants	higher dicots	Myoporaceae	<i>Eremophila mitchellii</i>			C		15
plants	higher dicots	Myoporaceae	<i>Eremophila longifolia</i>	berrigan		C		1/1
plants	higher dicots	Myrtaceae	<i>Corymbia terminalis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus coolabah</i>	coolabah		C		3/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus populnea</i>	poplar box		C		8/1
plants	higher dicots	Myrtaceae	<i>Melaleuca bracteata</i>			C		2
plants	higher dicots	Myrtaceae	<i>Corymbia dallachiana</i>			C		6/1
plants	higher dicots	Myrtaceae	<i>Corymbia hendersonii</i>			C		2/1
plants	higher dicots	Myrtaceae	<i>Corymbia trachyphloia</i> subsp. <i>trachyphloia</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Corymbia clarksoniana</i>			C		2
plants	higher dicots	Myrtaceae	<i>Corymbia lamprophylla</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia leichhardtii</i>	rustyjacket		C		4/2
plants	higher dicots	Myrtaceae	<i>Eucalyptus cambageana</i>	Dawson gum		C		8/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus microtheca</i>	coolibah		C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus thozetiana</i>			C		3
plants	higher dicots	Myrtaceae	<i>Corymbia erythrophloia</i>	variable-barked bloodwood		C		6/4
plants	higher dicots	Myrtaceae	<i>Eucalyptus orgadophila</i>	mountain coolibah		C		4/1

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plants	higher dicots	Myrtaceae	<i>Eucalyptus sicilifolia</i>			V		8/8
plants	higher dicots	Myrtaceae	<i>Eucalyptus tholiformis</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus melanophloia</i>			C		9
plants	higher dicots	Myrtaceae	<i>Eucalyptus tereticornis</i>			C		2
plants	higher dicots	Myrtaceae	<i>Leptospermum lamellatum</i>			C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus camaldulensis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus drepanophylla</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i> x <i>E.melanophloia</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Corymbia citriodora</i>	spotted gum		C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus exserta</i>	Queensland peppermint		C		1/1
plants	higher dicots	Myrtaceae	<i>Corymbia polycarpa</i>	long-fruited bloodwood		C		1
plants	higher dicots	Myrtaceae	<i>Melaleuca nervosa</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		8/3
plants	higher dicots	Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay ash		C		3
plants	higher dicots	Olacaceae	<i>Ximenia americana</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Jasminum didymum</i>			C		1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa</i> var. <i>microcarpa</i>			C		3/3
plants	higher dicots	Oleaceae	<i>Jasminum simplicifolium</i> subsp. <i>australiense</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa</i>			C		1
plants	higher dicots	Oleaceae	<i>Jasminum didymum</i> subsp. <i>lineare</i>			C		1
plants	higher dicots	Oxalidaceae	<i>Oxalis</i>			C		2/1
plants	higher dicots	Oxalidaceae	<i>Oxalis perennans</i>			C		1/1
plants	higher dicots	Pentapetaceae	<i>Melhania oblongifolia</i>			C		5/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus maderaspatensis</i>			C		4/4
plants	higher dicots	Phyllanthaceae	<i>Bridelia leichhardtii</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus</i>			C		1
plants	higher dicots	Phyllanthaceae	<i>Flueggea leucopyrus</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Breynia oblongifolia</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus collinus</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus virgatus</i>			C		3/1
plants	higher dicots	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		8/1
plants	higher dicots	Pittosporaceae	<i>Bursaria incana</i>			C		5/1
plants	higher dicots	Pittosporaceae	<i>Pittosporum spinescens</i>			C		2
plants	higher dicots	Pittosporaceae	<i>Pittosporum angustifolium</i>			C		1
plants	higher dicots	Polygonaceae	<i>Persicaria orientalis</i>	princes feathers		C		1/1
plants	higher dicots	Polygonaceae	<i>Persicaria attenuata</i>			C		2/2
plants	higher dicots	Polygonaceae	<i>Persicaria lapathifolia</i>	pale knotweed		C		2/2
plants	higher dicots	Portulacaceae	<i>Portulaca oleracea</i>	pigweed	Y			3
plants	higher dicots	Portulacaceae	<i>Portulaca bicolor</i>			C		1
plants	higher dicots	Proteaceae	<i>Grevillea striata</i>	beefwood		C		1
plants	higher dicots	Proteaceae	<i>Hakea lorea</i> subsp. <i>lorea</i>			C		1
plants	higher dicots	Rhamnaceae	<i>Cryptandra speciosa</i> subsp. <i>strigosa</i>			C		2/2
plants	higher dicots	Rhamnaceae	<i>Ventilago viminalis</i>	supplejack		C		3
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		12/2
plants	higher dicots	Rubiaceae	<i>Psychotria daphnoides</i>			C		2/2
plants	higher dicots	Rubiaceae	<i>Triflorensia ixoroides</i>			C		1

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plants	higher dicots	Rubiaceae	<i>Everistia vacciniifolia</i>			C		3
plants	higher dicots	Rubiaceae	<i>Psydrax oleifolia</i>			C		4
plants	higher dicots	Rubiaceae	<i>Psydrax johnsonii</i>			C		7/1
plants	higher dicots	Rubiaceae	<i>Psydrax forsteri</i>			C		3/2
plants	higher dicots	Rubiaceae	<i>Pogonolobus reticulatus</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Spermacoce sp. (Dislyn A.R.Bean 14098)</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Oldenlandia coerulescens</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Citrus glauca</i>			C		12/10
plants	higher dicots	Rutaceae	<i>Boronia bipinnata</i>	rock boronia		C		1
plants	higher dicots	Rutaceae	<i>Geijera parviflora</i>	wilga		C		12/2
plants	higher dicots	Rutaceae	<i>Geijera salicifolia</i>	brush wilga		C		1/1
plants	higher dicots	Rutaceae	<i>Flindersia dissosperma</i>			C		5/4
plants	higher dicots	Rutaceae	<i>Boronia occidentalis</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Philotheca difformis subsp. difformis</i>			C		1/1
plants	higher dicots	Santalaceae	<i>Santalum lanceolatum</i>			C		3/1
plants	higher dicots	Sapindaceae	<i>Alectryon diversifolius</i>	scrub boonaree		C		1
plants	higher dicots	Sapindaceae	<i>Dodonaea stenophylla</i>			C		1
plants	higher dicots	Sapindaceae	<i>Alectryon oleifolius</i>			C		2
plants	higher dicots	Sapindaceae	<i>Atalaya hemiglauca</i>			C		7
plants	higher dicots	Sapindaceae	<i>Dodonaea filifolia</i>			C		1
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa subsp. spatulata</i>			C		3/1
plants	higher dicots	Sapindaceae	<i>Dodonaea tenuifolia</i>			C		1/1
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa</i>			C		1
plants	higher dicots	Sapindaceae	<i>Alectryon connatus</i>	grey birds-eye		C		4/3
plants	higher dicots	Sapotaceae	<i>Planchonella pubescens</i>			C		1/1
plants	higher dicots	Solanaceae	<i>Solanum mitchellianum</i>			C		1/1
plants	higher dicots	Solanaceae	<i>Solanum seaforthianum</i>	Brazilian nightshade	Y			1
plants	higher dicots	Solanaceae	<i>Physalis lanceifolia</i>		Y			1/1
plants	higher dicots	Solanaceae	<i>Solanum parvifolium</i>			C		2
plants	higher dicots	Solanaceae	<i>Datura leichhardtii</i>	native thornapple	Y			1/1
plants	higher dicots	Solanaceae	<i>Solanum nodiflorum</i>		Y			1/1
plants	higher dicots	Solanaceae	<i>Solanum ellipticum</i>	potato bush		C		7
plants	higher dicots	Solanaceae	<i>Physalis ixocarpa</i>	annual ground cherry	Y			1/1
plants	higher dicots	Sparrmanniaceae	<i>Grewia latifolia</i>	dysentery plant		C		8/3
plants	higher dicots	Sparrmanniaceae	<i>Grewia retusifolia</i>			C		1
plants	higher dicots	Sparrmanniaceae	<i>Corchorus tomentellus</i>			C		1
plants	higher dicots	Sparrmanniaceae	<i>Corchorus trilocularis</i>			C		1/1
plants	higher dicots	Sterculiaceae	<i>Brachychiton australis</i>	broad-leaved bottle tree		C		2/1
plants	higher dicots	Sterculiaceae	<i>Brachychiton bidwillii</i>	little kurrajong		C		1/1
plants	higher dicots	Sterculiaceae	<i>Brachychiton rupestris</i>			C		3/1
plants	higher dicots	Stylidiaceae	<i>Stylidium eglandulosum</i>			C		1
plants	higher dicots	Thymelaeaceae	<i>Pimelea haematostachya</i>			C		1
plants	higher dicots	Ulmaceae	<i>Trema tomentosa</i>			C		1/1
plants	higher dicots	Urticaceae	<i>Dendrocnide photinophylla</i>	shiny-leaved stinging tree		C		1/1
plants	higher dicots	Verbenaceae	<i>Verbena africana</i>			C		1/1
plants	higher dicots	Verbenaceae	<i>Verbena macrostachya</i>			C		1/1

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plants	higher dicots	Verbenaceae	<i>Lantana montevidensis</i>	creeping lantana	Y			1/1
plants	higher dicots	Vitaceae	<i>Cissus oblonga</i>			C		1/1
plants	higher dicots	Vitaceae	<i>Clematicissus opaca</i>			C		2/1
plants	higher dicots	Zygophyllaceae	<i>Tribulus micrococcus</i>	yellow vine		C		2/2
plants	higher dicots	Zygophyllaceae	<i>Tribulus terrestris</i>	caltrop		C		2/1
plants	lower dicots	Menispermaceae	<i>Tinospora smilacina</i>	snakevine		C		1
plants	lower dicots	Menispermaceae	<i>Stephania japonica</i>			C		1
plants	monocots	Amaryllidaceae	<i>Crinum flaccidum</i>	Murray lily		C		1
plants	monocots	Commelinaceae	<i>Commelina diffusa</i>	wandering jew		C		1
plants	monocots	Commelinaceae	<i>Commelina ensifolia</i>	scurvy grass		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus fulvus</i>			C		2/2
plants	monocots	Cyperaceae	<i>Cyperus gunnii</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus gilesii</i>			C		3/3
plants	monocots	Cyperaceae	<i>Cyperus gracilis</i>			C		8/1
plants	monocots	Cyperaceae	<i>Cyperus pygmaeus</i>	dwarf sedge		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus rotundus</i>	nutgrass	Y			1/1
plants	monocots	Cyperaceae	<i>Cyperus bowmannii</i>			C		2/1
plants	monocots	Cyperaceae	<i>Cyperus concinnus</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus difformis</i>	rice sedge		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus javanicus</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus tuberosus</i>		Y			1
plants	monocots	Cyperaceae	<i>Cyperus leiocaulon</i>			C		1/1
plants	monocots	Cyperaceae	<i>Scleria sphacelata</i>			C		2/1
plants	monocots	Cyperaceae	<i>Scleria mackaviensis</i>			C		2/2
plants	monocots	Cyperaceae	<i>Bulbostylis turbinata</i>			C		1/1
plants	monocots	Cyperaceae	<i>Fimbristylis aestivalis</i>			C		1/1
plants	monocots	Cyperaceae	<i>Fimbristylis sieberiana</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus nutans</i> var. <i>eleusinoides</i>	flatsedge		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus dietrichiae</i> var. <i>brevibracteatus</i>			C		2
plants	monocots	Cyperaceae	<i>Cyperus bifax</i>	western nutgrass		C		1
plants	monocots	Cyperaceae	<i>Fimbristylis</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus iria</i>			C		1/1
plants	monocots	Hemerocallidaceae	<i>Dianella caerulea</i>			C		1
plants	monocots	Hemerocallidaceae	<i>Dianella caerulea</i> var. <i>vannata</i>			C		1/1
plants	monocots	Hemerocallidaceae	<i>Dianella longifolia</i>			C		1
plants	monocots	Hypoxidaceae	<i>Hypoxis arillacea</i>			C		1/1
plants	monocots	Hypoxidaceae	<i>Hypoxis pratensis</i>			C		1/1
plants	monocots	Laxmanniaceae	<i>Lomandra longifolia</i>			C		5
plants	monocots	Laxmanniaceae	<i>Lomandra</i>			C		1
plants	monocots	Laxmanniaceae	<i>Eustrephus latifolius</i>	wombat berry		C		2
plants	monocots	Orchidaceae	<i>Cymbidium canaliculatum</i>			C		2
plants	monocots	Poaceae	<i>Aristida queenslandica</i> var. <i>dissimilis</i>			C		10
plants	monocots	Poaceae	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>			C		4/1
plants	monocots	Poaceae	<i>Tragus australianus</i>	small burr grass		C		3
plants	monocots	Poaceae	<i>Aristida longicollis</i>			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Bothriochloa bladhii</i>			C		4
plants	monocots	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		3
plants	monocots	Poaceae	<i>Dichanthium fecundum</i>	curly bluegrass		C		1/1
plants	monocots	Poaceae	<i>Dichanthium sericeum</i>			C		6
plants	monocots	Poaceae	<i>Digitaria parviflora</i>			C		7
plants	monocots	Poaceae	<i>Eragrostis kennedyae</i>	small-flowered lovegrass		C		1/1
plants	monocots	Poaceae	<i>Eragrostis lacunaria</i>	purple lovegrass		C		10/1
plants	monocots	Poaceae	<i>Eragrostis tenellula</i>	delicate lovegrass		C		1
plants	monocots	Poaceae	<i>Leptochloa decipiens</i>			C		5
plants	monocots	Poaceae	<i>Panicum decompositum</i>			C		6
plants	monocots	Poaceae	<i>Setaria verticillata</i>	whorled pigeon grass	Y			1
plants	monocots	Poaceae	<i>Sporobolus contiguus</i>			C		1
plants	monocots	Poaceae	<i>Sporobolus scabridus</i>			C		2/1
plants	monocots	Poaceae	<i>Aristida jerichoensis</i>			C		1
plants	monocots	Poaceae	<i>Cymbopogon bombycinus</i>	silky oilgrass		C		3/2
plants	monocots	Poaceae	<i>Digitaria breviglumis</i>			C		2
plants	monocots	Poaceae	<i>Eragrostis parviflora</i>	weeping lovegrass		C		2/1
plants	monocots	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		9/1
plants	monocots	Poaceae	<i>Iseilema vaginiflorum</i>	red flinders grass		C		1
plants	monocots	Poaceae	<i>Setaria oplismenoides</i>			C		1/1
plants	monocots	Poaceae	<i>Alloteropsis semialata</i>	cockatoo grass		C		1
plants	monocots	Poaceae	<i>Aristida caput-medusae</i>			C		10
plants	monocots	Poaceae	<i>Bothriochloa ewartiana</i>	desert bluegrass		C		2
plants	monocots	Poaceae	<i>Cleistochloa subjuncea</i>			C		1/1
plants	monocots	Poaceae	<i>Enneapogon intermedius</i>			C		1/1
plants	monocots	Poaceae	<i>Enneapogon lindleyanus</i>			C		10
plants	monocots	Poaceae	<i>Enneapogon polyphyllus</i>	leafy nineawn		C		1
plants	monocots	Poaceae	<i>Enteropogon acicularis</i>	curly windmill grass		C		3
plants	monocots	Poaceae	<i>Enteropogon unispiceus</i>			C		4
plants	monocots	Poaceae	<i>Eragrostis cilianensis</i>		Y			1
plants	monocots	Poaceae	<i>Moorochloa eruciformis</i>		Y			2/2
plants	monocots	Poaceae	<i>Panicum queenslandicum</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium criniforme</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium globoideum</i>	sago grass		C		2/1
plants	monocots	Poaceae	<i>Paspalidium jubiflorum</i>	warrego grass		C		1
plants	monocots	Poaceae	<i>Setaria paspalidioides</i>			C		2/1
plants	monocots	Poaceae	<i>Thyridolepis xerophila</i>			C		6/1
plants	monocots	Poaceae	<i>Urochloa mosambicensis</i>	sabi grass	Y			3/2
plants	monocots	Poaceae	<i>Ancistrachne uncinulata</i>	hooky grass		C		3/2
plants	monocots	Poaceae	<i>Calypochloa gracillima</i>			C		3
plants	monocots	Poaceae	<i>Dactyloctenium radulans</i>	button grass		C		2/1
plants	monocots	Poaceae	<i>Enneapogon purpurascens</i>			C		3/1
plants	monocots	Poaceae	<i>Eragrostis megalosperma</i>			C		2/1
plants	monocots	Poaceae	<i>Paspalidium caespitosum</i>	brigalow grass		C		3/1
plants	monocots	Poaceae	<i>Paspalidium constrictum</i>			C		5/5
plants	monocots	Poaceae	<i>Pseudoraphis spinescens</i>	spiny mudgrass		C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Sporobolus actinocladus</i>	katoora grass		C		3/1
plants	monocots	Poaceae	<i>Enteropogon paucispiceus</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium albobillosum</i>			C		2/2
plants	monocots	Poaceae	<i>Sporobolus australasicus</i>			C		1
plants	monocots	Poaceae	<i>Bothriochloa erianthoides</i>	satintop grass		C		1/1
plants	monocots	Poaceae	<i>Cymbopogon queenslandicus</i>			C		1
plants	monocots	Poaceae	<i>Digitaria divaricatissima</i>	spreading umbrella grass		C		1/1
plants	monocots	Poaceae	<i>Thyridolepis mitchelliana</i>	mulga mitchell grass		C		1/1
plants	monocots	Poaceae	<i>Dichanthium queenslandicum</i>			V	V	4/4
plants	monocots	Poaceae	<i>Eriochloa pseudoacrotricha</i>			C		1/1
plants	monocots	Poaceae	<i>Leptochloa fusca subsp. fusca</i>			C		1/1
plants	monocots	Poaceae	<i>Cynodon dactylon var. dactylon</i>		Y			1/1
plants	monocots	Poaceae	<i>Chloris divaricata var. divaricata</i>	slender chloris		C		3/1
plants	monocots	Poaceae	<i>Bothriochloa bladhii subsp. bladhii</i>			C		1
plants	monocots	Poaceae	<i>Dichanthium sericeum subsp. sericeum</i>			C		2/2
plants	monocots	Poaceae	<i>Leptochloa decipiens subsp. decipiens</i>			C		1/1
plants	monocots	Poaceae	<i>Panicum</i>			C		3
plants	monocots	Poaceae	<i>Aristida</i>			C		4
plants	monocots	Poaceae	<i>Digitaria</i>			C		1
plants	monocots	Poaceae	<i>Enneapogon</i>			C		3/1
plants	monocots	Poaceae	<i>Eragrostis</i>			C		3
plants	monocots	Poaceae	<i>Echinochloa</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium</i>			C		3
plants	monocots	Poaceae	<i>Perotis rara</i>	comet grass		C		2/1
plants	monocots	Poaceae	<i>Melinis repens</i>	red natal grass	Y			11
plants	monocots	Poaceae	<i>Panicum buncei</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida ramosa</i>	purple wiregrass		C		3/1
plants	monocots	Poaceae	<i>Chloris virgata</i>	feathertop rhodes grass	Y			1
plants	monocots	Poaceae	<i>Panicum effusum</i>			C		3
plants	monocots	Poaceae	<i>Setaria dielsii</i>			C		5
plants	monocots	Poaceae	<i>Setaria surgens</i>			C		4/1
plants	monocots	Poaceae	<i>Sorghum bicolor</i>	forage sorghum	Y			1/1
plants	monocots	Poaceae	<i>Aristida lignosa</i>			C		3
plants	monocots	Poaceae	<i>Digitaria orbata</i>			C		1/1
plants	monocots	Poaceae	<i>Eriochloa crebra</i>	spring grass		C		3/2
plants	monocots	Poaceae	<i>Hyparrhenia rufa</i>		Y			1/1
plants	monocots	Poaceae	<i>Leptochloa fusca</i>	brown beetle grass		C		1
plants	monocots	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		4
plants	monocots	Poaceae	<i>Urochloa foliosa</i>			C		4
plants	monocots	Poaceae	<i>Aristida calycina</i>			C		1
plants	monocots	Poaceae	<i>Aristida contorta</i>	bunched kerosene grass		C		1
plants	monocots	Poaceae	<i>Astrebla lappacea</i>	curly mitchell grass		C		1
plants	monocots	Poaceae	<i>Avena ludoviciana</i>		Y			1/1
plants	monocots	Poaceae	<i>Digitaria brownii</i>			C		4/4
plants	monocots	Poaceae	<i>Entolasia stricta</i>	wiry panic		C		3
plants	monocots	Poaceae	<i>Eriochloa procera</i>	slender cupgrass		C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Leptochloa neesii</i>			C		1
plants	monocots	Poaceae	<i>Sporobolus caroli</i>	fairy grass		C		4
plants	monocots	Poaceae	<i>Urochloa piligera</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida benthamii</i>			C		1
plants	monocots	Poaceae	<i>Aristida holathera</i>			C		3
plants	monocots	Poaceae	<i>Aristida latifolia</i>	feathertop wiregrass		C		7/2
plants	monocots	Poaceae	<i>Aristida lazaridis</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida leptopoda</i>	white speargrass		C		4/2
plants	monocots	Poaceae	<i>Aristida personata</i>			C		3
plants	monocots	Poaceae	<i>Astrebla squarrosa</i>	bull mitchell grass		C		2
plants	monocots	Poaceae	<i>Chloris ventricosa</i>	tall chloris		C		1
plants	monocots	Poaceae	<i>Chrysopogon fallax</i>			C		1
plants	monocots	Poaceae	<i>Digitaria bicornis</i>			C		1/1
plants	monocots	Poaceae	<i>Digitaria porrecta</i>				NT E	1/1
plants	monocots	Poaceae	<i>Echinochloa colona</i>	awnless barnyard grass	Y			1
plants	monocots	Poaceae	<i>Eragrostis sororia</i>			C		5
plants	monocots	Poaceae	<i>Eriachne mucronata</i>			C		1
plants	monocots	Poaceae	<i>Oplismenus aemulus</i>	creeping shade grass		C		1/1
plants	monocots	Poaceae	<i>Pennisetum ciliare</i>			C		11
plants	monocots	Poaceae	<i>Triodia mitchellii</i>	buck spinifex		C		1
plants	monocots	Poaceae	<i>Urochloa decumbens</i>		Y			1/1
plants	monocots	Poaceae	<i>Aristida gracilipes</i>			C		1
plants	monocots	Poaceae	<i>Cymbopogon obtectus</i>			C		1/1
plants	monocots	Poaceae	<i>Digitaria ramularis</i>			C		3
plants	monocots	Poaceae	<i>Enneapogon gracilis</i>	slender nineawn		C		3/1
plants	monocots	Poaceae	<i>Enteropogon ramosus</i>			C		1
plants	monocots	Poaceae	<i>Eragrostis elongata</i>			C		1
plants	monocots	Poaceae	<i>Eragrostis speciosa</i>			C		2
plants	monocots	Poaceae	<i>Eriochloa fatmensis</i>			C		1
plants	monocots	Poaceae	<i>Leptochloa ligulata</i>			C		1/1
plants	monocots	Poaceae	<i>Megathyrsus maximus</i>		Y			2
plants	monocots	Poaceae	<i>Panicum larcomianum</i>			C		2/1
plants	monocots	Poaceae	<i>Paspalidium distans</i>	shotgrass		C		4
plants	monocots	Poaceae	<i>Paspalidium gracile</i>	slender panic		C		10/2
plants	monocots	Potamogetonaceae	<i>Potamogeton crispus</i>	curly pondweed		C		1/1
plants	monocots	Typhaceae	<i>Typha orientalis</i>	broad-leaved cumbungi		C		1
plants	whisk ferns	Psilotaceae	<i>Psilotum nudum</i>	skeleton fork fern		C		1/1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 23.0953 to 23.5353
Longitude: 147.4747 to 147.9356
Email: hdick@aacrc.net.au
Date submitted: Monday 28 May 2012 16:06:07
Date extracted: Monday 28 May 2012 16:10:04

The number of records retrieved = 458

Disclaimer

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Feedback about Wildlife Online should be emailed to Wildlife.Online@derm.qld.gov.au

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Bufonidae	<i>Rhinella marina</i>	cane toad	Y			4
animals	amphibians	Hylidae	<i>Litoria inermis</i>	bumpy rocketfrog		C		3/1
animals	amphibians	Hylidae	<i>Litoria peronii</i>	emerald spotted treefrog		C		2
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		4
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		2
animals	amphibians	Hylidae	<i>Cyclorana brevipes</i>	superb collared frog		C		2/1
animals	amphibians	Hylidae	<i>Cyclorana alboguttata</i>	greenstripe frog		C		16/1
animals	amphibians	Hylidae	<i>Cyclorana novaehollandiae</i>	eastern snapping frog		C		4/1
animals	amphibians	Hylidae	<i>Litoria fallax</i>	eastern sedgefrog		C		1
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		6
animals	amphibians	Limnodynastidae	<i>Platyplectrum ornatum</i>	ornate burrowing frog		C		4
animals	amphibians	Myobatrachidae	<i>Uperoleia rugosa</i>	chubby gungan		C		1
animals	amphibians	Myobatrachidae	<i>Crinia deserticola</i>	chirping froglet		C		1
animals	birds	Acanthizidae	<i>Smicrornis brevirostris</i>	weebill		C		7
animals	birds	Acanthizidae	<i>Acanthiza nana</i>	yellow thornbill		C		4
animals	birds	Acanthizidae	<i>Acanthiza apicalis</i>	inland thornbill		C		6
animals	birds	Acanthizidae	<i>Acanthiza reguloides</i>	buff-rumped thornbill		C		5
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		4
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		2
animals	birds	Acanthizidae	<i>Chthonicola sagittata</i>	speckled warbler		C		5
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		2
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk		C		1
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		1
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		1
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		4
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		3
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		7
animals	birds	Aegothelidae	<i>Aegotheles cristatus</i>	Australian owl-nightjar		C		1
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		1
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		NT		1
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		1
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		1
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		6
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		7
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		7
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		2
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		1
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		1
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		1
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		2
animals	birds	Artamidae	<i>Artamus superciliosus</i>	white-browed woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pied butcherbird		C		7
animals	birds	Artamidae	<i>Artamus minor</i>	little woodswallow		C		2
animals	birds	Artamidae	<i>Artamus cinereus</i>	black-faced woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		9
animals	birds	Artamidae	<i>Artamus personatus</i>	masked woodswallow		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Artamidae	<i>Strepera graculina</i>	pied currawong		C		8
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		6
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		1
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		3
animals	birds	Cacatuidae	<i>Calyptorhynchus funereus</i>	yellow-tailed black-cockatoo		C		1
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		9
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		10
animals	birds	Cacatuidae	<i>Nymphicus hollandicus</i>	cockatiel		C		7
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		3
animals	birds	Campephagidae	<i>Coracina maxima</i>	ground cuckoo-shrike		C		1
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		6
animals	birds	Casuariidae	<i>Dromaius novaehollandiae</i>	emu		C		2
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		4
animals	birds	Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)		C		3
animals	birds	Charadriidae	<i>Vanellus tricolor</i>	banded lapwing		C		2
animals	birds	Charadriidae	<i>Elseya melanops</i>	black-fronted dotterel		C		3
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		2
animals	birds	Climacteridae	<i>Climacteris picumnus</i>	brown treecreeper		C		1
animals	birds	Columbidae	<i>Geopelia cuneata</i>	diamond dove		C		2
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		5
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		12
animals	birds	Columbidae	<i>Phaps chalcoptera</i>	common bronzewing		C		2
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		4
animals	birds	Corcoracidae	<i>Corcorax melanorhamphos</i>	white-winged chough		C		2
animals	birds	Corcoracidae	<i>Struthidea cinerea</i>	apostlebird		C		10
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		13
animals	birds	Corvidae	<i>Corvus coronoides</i>	Australian raven		C		3
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		2
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		4
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		3
animals	birds	Cuculidae	<i>Chalcites basal</i>	Horsfield's bronze-cuckoo		C		3
animals	birds	Cuculidae	<i>Chalcites osculans</i>	black-eared cuckoo		C		1
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		1
animals	birds	Estrildidae	<i>Neochmia modesta</i>	plum-headed finch		C		2
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		2
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		8
animals	birds	Eurostopodidae	<i>Eurostopodus argus</i>	spotted nightjar		C		1
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		7
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		5
animals	birds	Gruidae	<i>Grus rubicunda</i>	brilga		C		6
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		3
animals	birds	Halcyonidae	<i>Todiramphus pyrrhopygius</i>	red-backed kingfisher		C		1
animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		2
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		10
animals	birds	Halcyonidae	<i>Todiramphus macleayi</i>	forest kingfisher		C		1
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		1

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animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		4
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		6
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		9
animals	birds	Megaluridae	<i>Cincloramphus mathewsi</i>	rufous songlark		C		2
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		3
animals	birds	Meliphagidae	<i>Melithreptus lunatus</i>	white-naped honeyeater		C		1
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		9
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		6
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		8
animals	birds	Meliphagidae	<i>Ptilotula penicillatus</i>	white-plumed honeyeater		C		7
animals	birds	Meliphagidae	<i>Acanthagenys rufogularis</i>	spiny-cheeked honeyeater		C		9
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		5
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		8
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		2
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		11
animals	birds	Meliphagidae	<i>Gavicalis virescens</i>	singing honeyeater		C		6
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		7
animals	birds	Meliphagidae	<i>Ptilotula fuscus</i>	fuscous honeyeater		C		1/1
animals	birds	Meliphagidae	<i>Ptilotula plumulus</i>	grey-fronted honeyeater		C		2
animals	birds	Meliphagidae	<i>Manorina flavigula</i>	yellow-throated miner		C		4
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		6
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		5
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		12
animals	birds	Monarchidae	<i>Myiagra inquieta</i>	restless flycatcher		C		2
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		3
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		6
animals	birds	Oriolidae	<i>Sphecotheres vieilloti</i>	Australasian figbird		C		1
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		4
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		4
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		7
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		13
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		12
animals	birds	Pardalotidae	<i>Pardalotus punctatus</i>	spotted pardalote		C		1
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		1
animals	birds	Petroicidae	<i>Petroica goodenovii</i>	red-capped robin		C		2
animals	birds	Petroicidae	<i>Eopsaltria australis</i>	eastern yellow robin		C		1
animals	birds	Petroicidae	<i>Melanodryas cucullata</i>	hooded robin		C		2
animals	birds	Petroicidae	<i>Microeca fascinans</i>	jacky winter		C		8
animals	birds	Phaethontidae	<i>Phaethon rubricauda</i>	red-tailed tropicbird		V		1
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		1
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		1
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		1
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		1
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		7
animals	birds	Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		10
animals	birds	Psittacidae	<i>Melopsittacus undulatus</i>	budgerigar		C		4

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animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		10
animals	birds	Psittacidae	<i>Trichoglossus chlorolepidotus</i>	scaly-breasted lorikeet		C		1
animals	birds	Psittacidae	<i>Platycercus adscitus palliceps</i>	pale-headed rosella (southern form)		C		2
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		8
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	spotted bowerbird		C		8
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		8
animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		12
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		7
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		2
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		1
animals	mammals	Bovidae	<i>Bos taurus</i>	European cattle	Y			1
animals	mammals	Dasyuridae	<i>Sminthopsis macroura</i>	stripe-faced dunnart		C		1
animals	mammals	Dasyuridae	<i>Dasyurus hallucatus</i>	northern quoll		C	E	1
animals	mammals	Emballonuridae	<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail bat		C		2
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			2
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		5
animals	mammals	Macropodidae	<i>Macropus robustus</i>	common wallaroo		C		2
animals	mammals	Macropodidae	<i>Wallabia bicolor</i>	swamp wallaby		C		6
animals	mammals	Macropodidae	<i>Petrogale herberti</i>	Herbert's rock-wallaby		C		12/9
animals	mammals	Macropodidae	<i>Lagorchestes conspicillatus</i>	spectacled hare-wallaby		C		28/2
animals	mammals	Muridae	<i>Pseudomys patrius</i>	eastern pebble-mound mouse		C		2
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			3
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat		C		1/1
animals	mammals	Muridae	<i>Pseudomys delicatulus</i>	delicate mouse		C		1
animals	mammals	Muridae	<i>Hydromys chrysogaster</i>	water rat		C		1
animals	mammals	Peramelidae	<i>Isoodon macrourus</i>	northern brown bandicoot		C		1
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider		C		1
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		1
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		C	V	5
animals	mammals	Potoroidae	<i>Aepyprymnus rufescens</i>	rufous bettong		C		4
animals	mammals	Pteropodidae	<i>Pteropus scapulatus</i>	little red flying-fox		C		2
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		C		1
animals	mammals	Vespertilionidae	<i>Vespadelus pumilus</i>	eastern forest bat		C		1
animals	mammals	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's wattled bat		C		1/1
animals	reptiles	Agamidae	<i>Amphibolurus nobbi</i>			C		1/1
animals	reptiles	Agamidae	<i>Pogona barbata</i>	bearded dragon		C		2
animals	reptiles	Agamidae	<i>Diporiphora australis</i>			C		1/1
animals	reptiles	Agamidae	<i>Chlamydosaurus kingii</i>	frilled lizard		C		1
animals	reptiles	Boidae	<i>Aspidites melanocephalus</i>	black-headed python		C		1
animals	reptiles	Boidae	<i>Antaresia maculosa</i>	spotted python		C		1
animals	reptiles	Carphodactylidae	<i>Nephrurus asper</i>	spiny knob-tailed gecko		C		1
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		1
animals	reptiles	Colubridae	<i>Dendrelaphis punctulata</i>	common tree snake		C		1
animals	reptiles	Colubridae	<i>Tropidonophis mairii</i>	freshwater snake		C		2
animals	reptiles	Colubridae	<i>Boiga irregularis</i>	brown tree snake		C		1
animals	reptiles	Diplodactylidae	<i>Oedura monilis</i>			C		2/1

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animals	reptiles	Diplodactylidae	<i>Amolosia rhombifer</i>	zig-zag gecko		C		1
animals	reptiles	Elapidae	<i>Hoplocephalus bitorquatus</i>	pale-headed snake		C		1
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		2
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		1
animals	reptiles	Elapidae	<i>Furina diadema</i>	red-naped snake		C		1
animals	reptiles	Elapidae	<i>Cryptophis boschmai</i>	Carpentaria whip snake		C		1
animals	reptiles	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's gecko		C		5
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>			C		1/1
animals	reptiles	Gekkonidae	<i>Gehyra catenata</i>			C		2/2
animals	reptiles	Pygopodidae	<i>Delma tincta</i>			C		1/1
animals	reptiles	Pygopodidae	<i>Pygopus lepidopodus</i>	common scaly-foot		C		1
animals	reptiles	Scincidae	<i>Cryptoblepharus pannosus</i>	ragged snake-eyed skink		C		1/1
animals	reptiles	Scincidae	<i>Lerista punctatovittata</i>			C		1
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		1
animals	reptiles	Scincidae	<i>Egernia striolata</i>	tree skink		C		2
animals	reptiles	Scincidae	<i>Ctenotus robustus</i>			C		1
animals	reptiles	Scincidae	<i>Carlia pectoralis</i>			C		3
animals	reptiles	Scincidae	<i>Egernia rugosa</i>	yakka skink		V	V	1
animals	reptiles	Scincidae	<i>Menetia sp.</i>					1
animals	reptiles	Scincidae	<i>Lerista fragilis</i>			C		2
animals	reptiles	Typhlopidae	<i>Ramphotyphlops proximus</i>			C		1
animals	reptiles	Typhlopidae	<i>Ramphotyphlops ligatus</i>			C		1/1
animals	reptiles	Varanidae	<i>Varanus gouldii</i>	sand monitor		C		2
animals	reptiles	Varanidae	<i>Varanus tristis</i>	black-tailed monitor		C		2
plants	conifers	Cupressaceae	<i>Callitris glaucophylla</i>	white cypress pine		C		2
plants	ferns	Adiantaceae	<i>Cheilanthes brownii</i>			C		1
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi</i>			C		1
plants	ferns	Adiantaceae	<i>Cheilanthes</i>			C		2
plants	higher dicots	Acanthaceae	<i>Brunoniella australis</i>	blue trumpet		C		1
plants	higher dicots	Acanthaceae	<i>Rostellularia adscendens</i>			C		1
plants	higher dicots	Amaranthaceae	<i>Gomphrena celosioides</i>	gomphrena weed	Y			1
plants	higher dicots	Amaranthaceae	<i>Amaranthus interruptus</i>			C		1/1
plants	higher dicots	Amaranthaceae	<i>Alternanthera</i>			C		1
plants	higher dicots	Amaranthaceae	<i>Achyranthes aspera</i>			C		3
plants	higher dicots	Amaranthaceae	<i>Nyssanthus diffusa</i>	barbed-wire weed		C		2
plants	higher dicots	Amaranthaceae	<i>Gomphrena</i>			C		1
plants	higher dicots	Apocynaceae	<i>Marsdenia viridiflora</i>			C		2
plants	higher dicots	Apocynaceae	<i>Parsonsia straminea</i>	monkey rope		C		1
plants	higher dicots	Apocynaceae	<i>Alstonia constricta</i>	bitterbark		C		1
plants	higher dicots	Apocynaceae	<i>Carissa ovata</i>	currantbush		C		15
plants	higher dicots	Apocynaceae	<i>Parsonsia</i>			C		2
plants	higher dicots	Asclepiadaceae	<i>Sarcostemma</i>			C		1
plants	higher dicots	Asteraceae	<i>Cyanthillium cinereum</i>			C		2
plants	higher dicots	Asteraceae	<i>Vittadinia tenuissima</i>	western New Holland daisy		C		1
plants	higher dicots	Asteraceae	<i>Wedelia spilanthoides</i>			C		2/1
plants	higher dicots	Asteraceae	<i>Ozothamnus cassinioides</i>			C		1/1

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plants	higher dicots	Asteraceae	<i>Gnaphalium diamantinense</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Parthenium hysterophorus</i>	parthenium weed	Y			1
plants	higher dicots	Asteraceae	<i>Pterocaulon serrulatum</i> var. <i>serrulatum</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Euchiton</i> sp. (Hughenden C.E.Hubbard+ 7639)			C		1/1
plants	higher dicots	Asteraceae	<i>Bidens pilosa</i>		Y			1
plants	higher dicots	Asteraceae	<i>Calotis lappulacea</i>	yellow burr daisy		C		1/1
plants	higher dicots	Asteraceae	<i>Vittadinia pustulata</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Rhodanthe polyphylla</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Pterocaulon redolens</i>			C		1
plants	higher dicots	Asteraceae	<i>Peripleura hispidula</i>			C		2
plants	higher dicots	Asteraceae	<i>Cassinia laevis</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Calotis squamigera</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Minuria integerrima</i>	smooth minuria		C		1/1
plants	higher dicots	Boraginaceae	<i>Heliotropium amplexicaule</i>	blue heliotrope	Y			1/1
plants	higher dicots	Boraginaceae	<i>Heliotropium cunninghamii</i>			C		1/1
plants	higher dicots	Brassicaceae	<i>Cardamine</i>			C		1/1
plants	higher dicots	Cactaceae	<i>Opuntia</i>		Y			1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum carronii</i>	ebony tree		C		1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum hookeri</i>	Queensland ebony		C		1
plants	higher dicots	Caesalpiniaceae	<i>Cassia brewsteri</i>			C		2
plants	higher dicots	Campanulaceae	<i>Wahlenbergia</i>			C		1
plants	higher dicots	Capparaceae	<i>Capparis lasiantha</i>	nipan		C		5
plants	higher dicots	Capparaceae	<i>Capparis canescens</i>			C		1
plants	higher dicots	Casuarinaceae	<i>Casuarina cunninghamiana</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena ramulosa</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Maireana microphylla</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Enchylaena tomentosa</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Maireana</i>			C		3
plants	higher dicots	Chenopodiaceae	<i>Chenopodium carinatum</i>	green crumbweed		C		1/1
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i>			C		2
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i> var. <i>villosicalyx</i>			C		1
plants	higher dicots	Cucurbitaceae	<i>Cucurbita</i>			C		1
plants	higher dicots	Ebenaceae	<i>Diospyros humilis</i>	small-leaved ebony		C		2
plants	higher dicots	Ericaceae	<i>Melichrus</i>			C		1
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum australe</i>	cocaine tree		C		9
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum</i> sp. (Splityard Creek L.Pedley 5360)			C		1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia</i>			C		2
plants	higher dicots	Euphorbiaceae	<i>Chamaesyce drummondii</i>	caustic-weed		C		1
plants	higher dicots	Euphorbiaceae	<i>Ricinocarpos ledifolius</i>	scrub wedding bush		C		1/1
plants	higher dicots	Fabaceae	<i>Glycine</i>			C		4
plants	higher dicots	Fabaceae	<i>Indigofera</i>			C		4
plants	higher dicots	Fabaceae	<i>Glycine tabacina</i>	glycine pea		C		2
plants	higher dicots	Fabaceae	<i>Rhynchosia minima</i>			C		2
plants	higher dicots	Fabaceae	<i>Indigofera helmsii</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Tephrosia filipes</i> subsp. <i>filipes</i>			C		2/1
plants	higher dicots	Fabaceae	<i>Cullen australasicum</i>			C		1/1

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plants	higher dicots	Fabaceae	<i>Indigofera pratensis</i>			C		2/2
plants	higher dicots	Fabaceae	<i>Desmodium brachypodum</i>	large ticktrefoil		C		1/1
plants	higher dicots	Fabaceae	<i>Rhynchosia minima</i> var. <i>minima</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Rhynchosia minima</i> var. <i>australis</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Indigofera linnaei</i>	Birdsville indigo		C		1
plants	higher dicots	Gentianaceae	<i>Centaurium erythraea</i>	common centaury	Y			1/1
plants	higher dicots	Goodeniaceae	<i>Goodenia rotundifolia</i>			C		2
plants	higher dicots	Goodeniaceae	<i>Brunonia australis</i>	blue pincushion		C		1
plants	higher dicots	Lamiaceae	<i>Basilicum polystachyon</i>			C		1/1
plants	higher dicots	Lamiaceae	<i>Spartothamnella juncea</i>	native broom		C		1/1
plants	higher dicots	Loranthaceae	<i>Amyema miquelii</i>			C		1/1
plants	higher dicots	Loranthaceae	<i>Lysiana subfalcata</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Sida</i>			C		4
plants	higher dicots	Malvaceae	<i>Abutilon</i>			C		2
plants	higher dicots	Malvaceae	<i>Hibiscus</i>			C		3
plants	higher dicots	Malvaceae	<i>Malvastrum</i>			C		1
plants	higher dicots	Malvaceae	<i>Sida fibulifera</i>			C		1
plants	higher dicots	Malvaceae	<i>Sida filiformis</i>			C		2
plants	higher dicots	Malvaceae	<i>Sida atherophora</i>			C		1
plants	higher dicots	Malvaceae	<i>Sida hackettiana</i>			C		1
plants	higher dicots	Malvaceae	<i>Gossypium australe</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Hibiscus krichauffianus</i>			C		2
plants	higher dicots	Malvaceae	<i>Malvastrum americanum</i> var. <i>americanum</i>		Y			3
plants	higher dicots	Malvaceae	<i>Malvastrum coromandelianum</i> subsp. <i>coromandelianum</i>		Y			1/1
plants	higher dicots	Mimosaceae	<i>Acacia fodinalis</i>			C		2
plants	higher dicots	Mimosaceae	<i>Acacia harpophylla</i>	brigalow		C		3
plants	higher dicots	Mimosaceae	<i>Acacia salicina</i>	doolan		C		1
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia</i>			C		5
plants	higher dicots	Mimosaceae	<i>Acacia shirleyi</i>	lancewood		C		3
plants	higher dicots	Mimosaceae	<i>Acacia leptostachya</i>	Townsville wattle		C		1/1
plants	higher dicots	Mimosaceae	<i>Archidendropsis basaltica</i>	red lancewood		C		4
plants	higher dicots	Mimosaceae	<i>Archidendropsis thozetiana</i>			C		3/2
plants	higher dicots	Mimosaceae	<i>Acacia excelsa</i> subsp. <i>excelsa</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Acacia julifera</i> subsp. <i>curvinervia</i>			C		1/1
plants	higher dicots	Moraceae	<i>Ficus</i>			C		1
plants	higher dicots	Moraceae	<i>Ficus rubiginosa</i> forma <i>rubiginosa</i>			C		1/1
plants	higher dicots	Myoporaceae	<i>Myoporum</i>			C		5
plants	higher dicots	Myoporaceae	<i>Eremophila deserti</i>			C		2/1
plants	higher dicots	Myoporaceae	<i>Myoporum acuminatum</i>	coastal boobialla		C		1/1
plants	higher dicots	Myoporaceae	<i>Eremophila mitchellii</i>			C		8
plants	higher dicots	Myrtaceae	<i>Melaleuca linariifolia</i>	snow-in summer		C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus melanophloia</i>			C		14
plants	higher dicots	Myrtaceae	<i>Eucalyptus tereticornis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Leptospermum lamellatum</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus camaldulensis</i> subsp. <i>acuta</i>			C		1/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Myrtaceae	<i>Eucalyptus orgadophila</i>	mountain coolibah		C		2
plants	higher dicots	Myrtaceae	<i>Corymbia erythrophloia</i>	variable-barked bloodwood		C		8
plants	higher dicots	Myrtaceae	<i>Eucalyptus thozetiana</i>			C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus cambageana</i>	Dawson gum		C		5
plants	higher dicots	Myrtaceae	<i>Corymbia trachyphloia</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia clarksoniana</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay ash		C		2
plants	higher dicots	Myrtaceae	<i>Corymbia dallachiana</i>			C		10/2
plants	higher dicots	Myrtaceae	<i>Melaleuca viminalis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Melaleuca bracteata</i>			C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus populnea</i>	poplar box		C		5
plants	higher dicots	Myrtaceae	<i>Corymbia intermedia</i>	pink bloodwood		C		1
plants	higher dicots	Myrtaceae	<i>Corymbia citriodora</i>	spotted gum		C		2
plants	higher dicots	Myrtaceae	<i>Angophora leiocarpa</i>	rusty gum		C		1
plants	higher dicots	Myrtaceae	<i>Corymbia trachyphloia</i> subsp. <i>trachyphloia</i>			C		1
plants	higher dicots	Myrtaceae	<i>Asteromyrtus</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia</i>			C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		6
plants	higher dicots	Nyctaginaceae	<i>Boerhavia burbridgeana</i>			C		1
plants	higher dicots	Nyctaginaceae	<i>Boerhavia pubescens</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Notelaea microcarpa</i>			C		1
plants	higher dicots	Pentapetaceae	<i>Melhania oblongifolia</i>			C		1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus fuernrohrii</i>			C		2/1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus virgatus</i>			C		2
plants	higher dicots	Phyllanthaceae	<i>Breynia oblongifolia</i>			C		2
plants	higher dicots	Phyllanthaceae	<i>Breynia</i>			C		2
plants	higher dicots	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		2
plants	higher dicots	Pittosporaceae	<i>Bursaria incana</i>			C		3/1
plants	higher dicots	Pittosporaceae	<i>Pittosporum spinescens</i>			C		1
plants	higher dicots	Polygalaceae	<i>Polygala linariifolia</i>			C		1/1
plants	higher dicots	Portulacaceae	<i>Portulaca oleracea</i>	pigweed	Y			2
plants	higher dicots	Proteaceae	<i>Grevillea striata</i>	beefwood		C		2
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		6
plants	higher dicots	Rubiaceae	<i>Psydrax</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Pogonolobus reticulatus</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax odorata</i> subsp. <i>australiana</i>			C		1/1
plants	higher dicots	Rubiaceae	<i>Psydrax johnsonii</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax oleifolia</i>			C		1
plants	higher dicots	Rutaceae	<i>Flindersia dissosperma</i>			C		1
plants	higher dicots	Rutaceae	<i>Geijera parviflora</i>	wilga		C		7
plants	higher dicots	Santalaceae	<i>Santalum lanceolatum</i>			C		1
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa</i>			C		3
plants	higher dicots	Sapindaceae	<i>Atalaya hemiglauca</i>			C		5
plants	higher dicots	Sapindaceae	<i>Alectryon diversifolius</i>	scrub boonaree		C		2
plants	higher dicots	Sapindaceae	<i>Dodonaea viscosa</i> subsp. <i>spatulata</i>			C		1/1
plants	higher dicots	Sapotaceae	<i>Planchonella cotinifolia</i>			C		1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	higher dicots	Solanaceae	<i>Solanum</i>			C		1
plants	higher dicots	Solanaceae	<i>Solanum seaforthianum</i>	Brazilian nightshade	Y			1/1
plants	higher dicots	Sparrmanniaceae	<i>Grewia latifolia</i>	dysentery plant		C		5
plants	higher dicots	Sterculiaceae	<i>Brachychiton rupestris</i>			C		1
plants	higher dicots	Verbenaceae	<i>Lantana camara</i>		Y			1/1
plants	higher dicots	Violaceae	<i>Hybanthus monopetalus</i>			C		1
plants	higher dicots	Violaceae	<i>Hybanthus enneaspermus</i>			C		1/1
plants	higher dicots	Vitaceae	<i>Cissus hypoglauca</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus</i>			C		6
plants	monocots	Cyperaceae	<i>Cyperus iria</i>			C		1/1
plants	monocots	Cyperaceae	<i>Scleria mackaviensis</i>			C		1
plants	monocots	Cyperaceae	<i>Schoenus subaphyllus</i>			C		1/1
plants	monocots	Cyperaceae	<i>Scleria sphacelata</i>			C		1
plants	monocots	Cyperaceae	<i>Abildgaardia ovata</i>			C		2/1
plants	monocots	Cyperaceae	<i>Cyperus pygmaeus</i>	dwarf sedge		C		1/1
plants	monocots	Cyperaceae	<i>Fimbristylis</i>			C		1
plants	monocots	Cyperaceae	<i>Cyperus fulvus</i>			C		2/1
plants	monocots	Cyperaceae	<i>Cyperus gracilis</i>			C		4
plants	monocots	Hemerocallidaceae	<i>Dianella revoluta</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra filiformis</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra</i>			C		3
plants	monocots	Laxmanniaceae	<i>Lomandra multiflora subsp. multiflora</i>			C		1/1
plants	monocots	Laxmanniaceae	<i>Lomandra confertifolia</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra longifolia</i>			C		1
plants	monocots	Poaceae	<i>Panicum decompositum var. decompositum</i>			C		1/1
plants	monocots	Poaceae	<i>Bothriochloa decipiens var. cloncurrrensensis</i>			C		1/1
plants	monocots	Poaceae	<i>Chloris</i>			C		6
plants	monocots	Poaceae	<i>Aristida</i>			C		18
plants	monocots	Poaceae	<i>Entolasia</i>			C		2
plants	monocots	Poaceae	<i>Enneapogon</i>			C		6
plants	monocots	Poaceae	<i>Eragrostis</i>			C		4
plants	monocots	Poaceae	<i>Dichanthium</i>			C		2
plants	monocots	Poaceae	<i>Paspalidium</i>			C		2
plants	monocots	Poaceae	<i>Perotis rara</i>	comet grass		C		1/1
plants	monocots	Poaceae	<i>Melinis repens</i>	red natal grass	Y			3
plants	monocots	Poaceae	<i>Aristida ramosa</i>	purple wiregrass		C		1
plants	monocots	Poaceae	<i>Chloris virgata</i>	feathertop rhodes grass	Y			1
plants	monocots	Poaceae	<i>Panicum effusum</i>			C		4
plants	monocots	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		10
plants	monocots	Poaceae	<i>Triraphis mollis</i>	purple plumegrass		C		1/1
plants	monocots	Poaceae	<i>Urochloa gilesii</i>			C		1
plants	monocots	Poaceae	<i>Urochloa reptans</i>			C		1/1
plants	monocots	Poaceae	<i>Entolasia stricta</i>	wiry panic		C		1
plants	monocots	Poaceae	<i>Sporobolus caroli</i>	fairy grass		C		1
plants	monocots	Poaceae	<i>Aristida latifolia</i>	feathertop wiregrass		C		1
plants	monocots	Poaceae	<i>Aristida lazaridis</i>			C		3/1

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Aristida personata</i>			C		1/1
plants	monocots	Poaceae	<i>Chrysopogon fallax</i>			C		4
plants	monocots	Poaceae	<i>Eragrostis brownii</i>	Brown's lovegrass		C		2
plants	monocots	Poaceae	<i>Pennisetum ciliare</i>			C		6
plants	monocots	Poaceae	<i>Aristida gracilipes</i>			C		1/1
plants	monocots	Poaceae	<i>Enneapogon gracilis</i>	slender nineawn		C		4/4
plants	monocots	Poaceae	<i>Paspalidium distans</i>	shotgrass		C		1
plants	monocots	Poaceae	<i>Paspalidium gracile</i>	slender panic		C		3
plants	monocots	Poaceae	<i>Tragus australianus</i>	small burr grass		C		4
plants	monocots	Poaceae	<i>Bothriochloa bladhii</i>			C		1/1
plants	monocots	Poaceae	<i>Bothriochloa pertusa</i>		Y			1
plants	monocots	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		1
plants	monocots	Poaceae	<i>Dichanthium fecundum</i>	curly bluegrass		C		1/1
plants	monocots	Poaceae	<i>Dichanthium sericeum</i>			C		1
plants	monocots	Poaceae	<i>Digitaria parviflora</i>			C		1
plants	monocots	Poaceae	<i>Enneapogon nigricans</i>	niggerheads		C		1
plants	monocots	Poaceae	<i>Eragrostis lacunaria</i>	purple lovegrass		C		2
plants	monocots	Poaceae	<i>Panicum decompositum</i>			C		2
plants	monocots	Poaceae	<i>Sporobolus contiguus</i>			C		1
plants	monocots	Poaceae	<i>Alloteropsis cimicina</i>			C		1/1
plants	monocots	Poaceae	<i>Cymbopogon bombycinus</i>	silky oilgrass		C		2/1
plants	monocots	Poaceae	<i>Eragrostis leptocarpa</i>	drooping lovegrass		C		2
plants	monocots	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		8
plants	monocots	Poaceae	<i>Sporobolus mitchellii</i>	rat's tail couch		C		2
plants	monocots	Poaceae	<i>Aristida caput-medusae</i>			C		3
plants	monocots	Poaceae	<i>Bothriochloa ewartiana</i>	desert bluegrass		C		3
plants	monocots	Poaceae	<i>Enneapogon lindleyanus</i>			C		7/1
plants	monocots	Poaceae	<i>Enneapogon polyphyllus</i>	leafy nineawn		C		2
plants	monocots	Poaceae	<i>Enteropogon unispiceus</i>			C		1
plants	monocots	Poaceae	<i>Eragrostis cilianensis</i>		Y			1
plants	monocots	Poaceae	<i>Paspalidium criniforme</i>			C		2
plants	monocots	Poaceae	<i>Thyridolepis xerophila</i>			C		2/1
plants	monocots	Poaceae	<i>Dactyloctenium radulans</i>	button grass		C		1
plants	monocots	Poaceae	<i>Eragrostis megalosperma</i>			C		2/1
plants	monocots	Poaceae	<i>Paspalidium constrictum</i>			C		1
plants	monocots	Poaceae	<i>Enneapogon robustissimus</i>			C		1/1
plants	monocots	Poaceae	<i>Cymbopogon queenslandicus</i>			C		1
plants	monocots	Poaceae	<i>Eriochloa pseudoacrotricha</i>			C		1
plants	monocots	Poaceae	<i>Sporobolus coromandelianus</i>		Y			1/1
plants	monocots	Poaceae	<i>Eragrostis longipedicellata</i>			C		1
plants	monocots	Poaceae	<i>Aristida benthamii</i> var. <i>benthamii</i>			C		1
plants	monocots	Poaceae	<i>Panicum decompositum</i> var. <i>tenuius</i>			C		1
plants	monocots	Poaceae	<i>Bothriochloa bladhii</i> subsp. <i>bladhii</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida queenslandica</i> var. <i>dissimilis</i>			C		2

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



Wildlife Online Extract

Search Criteria: Species List for a Defined Area
Species: All
Type: All
Status: All
Records: All
Date: All
Latitude: 23.9978 to 23.5353
Longitude: 147.4747 to 147.9356
Email: hdick@aacrc.net.au
Date submitted: Monday 28 May 2012 16:00:43
Date extracted: Monday 28 May 2012 16:10:12

The number of records retrieved = 554

Disclaimer

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Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	amphibians	Hylidae	<i>Litoria caerulea</i>	common green treefrog		C		2
animals	amphibians	Hylidae	<i>Cyclorana alboguttata</i>	greenstripe frog		C		1
animals	amphibians	Hylidae	<i>Litoria latopalmata</i>	broad palmed rocketfrog		C		3
animals	amphibians	Hylidae	<i>Litoria rubella</i>	ruddy treefrog		C		1
animals	amphibians	Hylidae	<i>Litoria inermis</i>	bumpy rocketfrog		C		3
animals	amphibians	Limnodynastidae	<i>Limnodynastes tasmaniensis</i>	spotted grassfrog		C		1
animals	amphibians	Limnodynastidae	<i>Limnodynastes salmini</i>	salmon striped frog		C		2
animals	amphibians	Myobatrachidae	<i>Uperoleia rugosa</i>	chubby gungan		C		4/4
animals	amphibians	Myobatrachidae	<i>Crinia deserticola</i>	chirping froglet		C		1/1
animals	birds	Acanthizidae	<i>Gerygone fusca</i>	western gerygone		C		2
animals	birds	Acanthizidae	<i>Acanthiza nana</i>	yellow thornbill		C		3
animals	birds	Acanthizidae	<i>Smicromnis brevirostris</i>	weebill		C		4
animals	birds	Acanthizidae	<i>Chthonicola sagittata</i>	speckled warbler		C		9
animals	birds	Acanthizidae	<i>Acanthiza apicalis</i>	inland thornbill		C		5
animals	birds	Acanthizidae	<i>Sericornis frontalis</i>	white-browed scrubwren		C		1
animals	birds	Acanthizidae	<i>Gerygone albogularis</i>	white-throated gerygone		C		9
animals	birds	Acanthizidae	<i>Acanthiza reguloides</i>	buff-rumped thornbill		C		6
animals	birds	Acanthizidae	<i>Acanthiza chrysorrhoa</i>	yellow-rumped thornbill		C		8
animals	birds	Accipitridae	<i>Aviceda subcristata</i>	Pacific baza		C		1
animals	birds	Accipitridae	<i>Haliastur sphenurus</i>	whistling kite		C		26
animals	birds	Accipitridae	<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle		C		4
animals	birds	Accipitridae	<i>Hieraaetus morphnoides</i>	little eagle		C		5
animals	birds	Accipitridae	<i>Accipiter fasciatus</i>	brown goshawk		C		4
animals	birds	Accipitridae	<i>Lophoictinia isura</i>	square-tailed kite		NT		1
animals	birds	Accipitridae	<i>Circus approximans</i>	swamp harrier		C		2
animals	birds	Accipitridae	<i>Elanus axillaris</i>	black-shouldered kite		C		25
animals	birds	Accipitridae	<i>Circus assimilis</i>	spotted harrier		C		1
animals	birds	Accipitridae	<i>Milvus migrans</i>	black kite		C		5
animals	birds	Accipitridae	<i>Aquila audax</i>	wedge-tailed eagle		C		24
animals	birds	Accipitridae	<i>Accipiter cirrocephalus</i>	collared sparrowhawk		C		3
animals	birds	Accipitridae	<i>Erythrotriorchis radiatus</i>	red goshawk		E	V	1
animals	birds	Accipitridae	<i>Accipiter novaehollandiae</i>	grey goshawk		NT		1
animals	birds	Aegothelidae	<i>Aegotheles cristatus</i>	Australian owl-nightjar		C		7
animals	birds	Alaudidae	<i>Mirafra javanica</i>	Horsfield's bushlark		C		12
animals	birds	Anatidae	<i>Anas gracilis</i>	grey teal		C		19
animals	birds	Anatidae	<i>Malacorhynchus membranaceus</i>	pink-eared duck		C		3
animals	birds	Anatidae	<i>Nettapus coromandelianus</i>	cotton pygmy-goose		NT		4
animals	birds	Anatidae	<i>Dendrocygna arcuata</i>	wandering whistling-duck		C		4
animals	birds	Anatidae	<i>Dendrocygna eytoni</i>	plumed whistling-duck		C		6
animals	birds	Anatidae	<i>Chenonetta jubata</i>	Australian wood duck		C		15
animals	birds	Anatidae	<i>Anas superciliosa</i>	Pacific black duck		C		16
animals	birds	Anatidae	<i>Oxyura australis</i>	blue-billed duck		C		2
animals	birds	Anatidae	<i>Biziura lobata</i>	musk duck		C		1
animals	birds	Anatidae	<i>Cygnus atratus</i>	black swan		C		10
animals	birds	Anatidae	<i>Aythya australis</i>	hardhead		C		10
animals	birds	Anhingidae	<i>Anhinga novaehollandiae</i>	Australasian darter		C		11

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
animals	birds	Ardeidae	<i>Ardea intermedia</i>	intermediate egret		C		11
animals	birds	Ardeidae	<i>Ardea pacifica</i>	white-necked heron		C		10
animals	birds	Ardeidae	<i>Ardea modesta</i>	eastern great egret		C		5
animals	birds	Ardeidae	<i>Ardea ibis</i>	cattle egret		C		2
animals	birds	Ardeidae	<i>Egretta novaehollandiae</i>	white-faced heron		C		11
animals	birds	Ardeidae	<i>Nycticorax caledonicus</i>	Nankeen night-heron		C		4
animals	birds	Ardeidae	<i>Egretta garzetta</i>	little egret		C		6
animals	birds	Artamidae	<i>Cracticus torquatus</i>	grey butcherbird		C		24
animals	birds	Artamidae	<i>Artamus leucorhynchus</i>	white-breasted woodswallow		C		23
animals	birds	Artamidae	<i>Artamus superciliosus</i>	white-browed woodswallow		C		1
animals	birds	Artamidae	<i>Cracticus nigrogularis</i>	pied butcherbird		C		36
animals	birds	Artamidae	<i>Artamus minor</i>	little woodswallow		C		1
animals	birds	Artamidae	<i>Artamus cinereus</i>	black-faced woodswallow		C		6
animals	birds	Artamidae	<i>Cracticus tibicen</i>	Australian magpie		C		52
animals	birds	Artamidae	<i>Strepera graculina</i>	pied currawong		C		4
animals	birds	Burhinidae	<i>Burhinus grallarius</i>	bush stone-curlew		C		1
animals	birds	Cacatuidae	<i>Cacatua sanguinea</i>	little corella		C		1
animals	birds	Cacatuidae	<i>Cacatua galerita</i>	sulphur-crested cockatoo		C		34
animals	birds	Cacatuidae	<i>Eolophus roseicapillus</i>	galah		C		37
animals	birds	Cacatuidae	<i>Nymphicus hollandicus</i>	cockatiel		C		38
animals	birds	Cacatuidae	<i>Calyptorhynchus banksii</i>	red-tailed black-cockatoo		C		1
animals	birds	Campephagidae	<i>Coracina novaehollandiae</i>	black-faced cuckoo-shrike		C		21
animals	birds	Campephagidae	<i>Coracina papuensis</i>	white-bellied cuckoo-shrike		C		1
animals	birds	Campephagidae	<i>Coracina maxima</i>	ground cuckoo-shrike		C		6
animals	birds	Campephagidae	<i>Lalage sueurii</i>	white-winged triller		C		3
animals	birds	Casuariidae	<i>Dromaius novaehollandiae</i>	emu		C		9
animals	birds	Charadriidae	<i>Vanellus miles novaehollandiae</i>	masked lapwing (southern subspecies)		C		1
animals	birds	Charadriidae	<i>Elseya melanops</i>	black-fronted dotterel		C		5
animals	birds	Charadriidae	<i>Vanellus tricolor</i>	banded lapwing		C		1
animals	birds	Charadriidae	<i>Vanellus miles</i>	masked lapwing		C		6
animals	birds	Charadriidae	<i>Vanellus miles miles</i>	masked lapwing (northern subspecies)		C		8
animals	birds	Ciconiidae	<i>Ephippiorhynchus asiaticus</i>	black-necked stork		NT		4
animals	birds	Cisticolidae	<i>Cisticola exilis</i>	golden-headed cisticola		C		17
animals	birds	Climacteridae	<i>Climacteris picumnus</i>	brown treecreeper		C		4
animals	birds	Columbidae	<i>Geopelia striata</i>	peaceful dove		C		11
animals	birds	Columbidae	<i>Geopelia cuneata</i>	diamond dove		C		1
animals	birds	Columbidae	<i>Phaps chalcoptera</i>	common bronzewing		C		14
animals	birds	Columbidae	<i>Geopelia humeralis</i>	bar-shouldered dove		C		12
animals	birds	Columbidae	<i>Ocyphaps lophotes</i>	crested pigeon		C		44
animals	birds	Coraciidae	<i>Eurystomus orientalis</i>	dollarbird		C		6
animals	birds	Corcoracidae	<i>Struthidea cinerea</i>	apostlebird		C		38
animals	birds	Corcoracidae	<i>Corcorax melanorhamphos</i>	white-winged chough		C		4
animals	birds	Corvidae	<i>Corvus sp.</i>					4
animals	birds	Corvidae	<i>Corvus orru</i>	Torresian crow		C		31
animals	birds	Corvidae	<i>Corvus bennetti</i>	little crow		C		5
animals	birds	Corvidae	<i>Corvus coronoides</i>	Australian raven		C		4

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animals	birds	Cuculidae	<i>Chalcites basalis</i>	Horsfield's bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Chalcites lucidus</i>	shining bronze-cuckoo		C		1
animals	birds	Cuculidae	<i>Cacomantis pallidus</i>	pallid cuckoo		C		4
animals	birds	Cuculidae	<i>Eudynamys orientalis</i>	eastern koel		C		1
animals	birds	Cuculidae	<i>Centropus phasianinus</i>	pheasant coucal		C		21
animals	birds	Cuculidae	<i>Cacomantis flabelliformis</i>	fan-tailed cuckoo		C		1
animals	birds	Cuculidae	<i>Scythrops novaehollandiae</i>	channel-billed cuckoo		C		4
animals	birds	Dicruridae	<i>Dicrurus bracteatus</i>	spangled drongo		C		2
animals	birds	Estrildidae	<i>Taeniopygia bichenovii</i>	double-barred finch		C		23
animals	birds	Estrildidae	<i>Lonchura castaneothorax</i>	chestnut-breasted mannikin		C		2
animals	birds	Estrildidae	<i>Taeniopygia guttata</i>	zebra finch		C		8
animals	birds	Estrildidae	<i>Neochmia modesta</i>	plum-headed finch		C		3
animals	birds	Eurostopodidae	<i>Eurostopodus argus</i>	spotted nightjar		C		1
animals	birds	Falconidae	<i>Falco peregrinus</i>	peregrine falcon		C		4
animals	birds	Falconidae	<i>Falco cenchroides</i>	nankeen kestrel		C		39
animals	birds	Falconidae	<i>Falco subniger</i>	black falcon		C		12
animals	birds	Falconidae	<i>Falco berigora</i>	brown falcon		C		25
animals	birds	Gruidae	<i>Grus rubicunda</i>	broilga		C		16
animals	birds	Halcyonidae	<i>Dacelo leachii</i>	blue-winged kookaburra		C		4
animals	birds	Halcyonidae	<i>Dacelo novaeguineae</i>	laughing kookaburra		C		23
animals	birds	Halcyonidae	<i>Todiramphus sanctus</i>	sacred kingfisher		C		2
animals	birds	Halcyonidae	<i>Todiramphus macleayii</i>	forest kingfisher		C		2
animals	birds	Halcyonidae	<i>Todiramphus pyrrhopygus</i>	red-backed kingfisher		C		3
animals	birds	Hirundinidae	<i>Petrochelidon ariel</i>	fairy martin		C		7
animals	birds	Hirundinidae	<i>Hirundo neoxena</i>	welcome swallow		C		3
animals	birds	Hirundinidae	<i>Petrochelidon nigricans</i>	tree martin		C		20
animals	birds	Jacaniidae	<i>Irediparra gallinacea</i>	comb-crested jacana		C		3
animals	birds	Laridae	<i>Hydroprogne caspia</i>	Caspian tern		C		4
animals	birds	Laridae	<i>Chroicocephalus novaehollandiae</i>	silver gull		C		4
animals	birds	Maluridae	<i>Malurus melanocephalus</i>	red-backed fairy-wren		C		42
animals	birds	Maluridae	<i>Malurus lamberti</i>	variegated fairy-wren		C		16
animals	birds	Maluridae	<i>Malurus cyaneus</i>	superb fairy-wren		C		17
animals	birds	Megaluridae	<i>Cincloramphus mathewsi</i>	rufous songlark		C		2
animals	birds	Megaluridae	<i>Cincloramphus cruralis</i>	brown songlark		C		7
animals	birds	Megaluridae	<i>Megalurus gramineus</i>	little grassbird		C		1
animals	birds	Megaluridae	<i>Megalurus timoriensis</i>	tawny grassbird		C		1
animals	birds	Megapodiidae	<i>Alectura lathami</i>	Australian brush-turkey		C		1
animals	birds	Meliphagidae	<i>Philemon corniculatus</i>	noisy friarbird		C		14
animals	birds	Meliphagidae	<i>Acanthagenys rufogularis</i>	spiny-cheeked honeyeater		C		16
animals	birds	Meliphagidae	<i>Plectorhyncha lanceolata</i>	striped honeyeater		C		16
animals	birds	Meliphagidae	<i>Melithreptus albogularis</i>	white-throated honeyeater		C		4
animals	birds	Meliphagidae	<i>Ptilotula penicillatus</i>	white-plumed honeyeater		C		5
animals	birds	Meliphagidae	<i>Philemon citreogularis</i>	little friarbird		C		14
animals	birds	Meliphagidae	<i>Manorina melanocephala</i>	noisy miner		C		20
animals	birds	Meliphagidae	<i>Sugomel niger</i>	black honeyeater		C		1
animals	birds	Meliphagidae	<i>Ptilotula fuscus</i>	fuscous honeyeater		C		1

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animals	birds	Meliphagidae	<i>Meliphaga lewinii</i>	Lewin's honeyeater		C		2
animals	birds	Meliphagidae	<i>Caligavis chrysops</i>	yellow-faced honeyeater		C		2
animals	birds	Meliphagidae	<i>Entomyzon cyanotis</i>	blue-faced honeyeater		C		39
animals	birds	Meliphagidae	<i>Manorina flavigula</i>	yellow-throated miner		C		44
animals	birds	Meliphagidae	<i>Ptilotula plumulus</i>	grey-fronted honeyeater		C		1
animals	birds	Meliphagidae	<i>Gavicalis virescens</i>	singing honeyeater		C		21
animals	birds	Meliphagidae	<i>Lichmera indistincta</i>	brown honeyeater		C		11
animals	birds	Meropidae	<i>Merops ornatus</i>	rainbow bee-eater		C		7
animals	birds	Monarchidae	<i>Myiagra inquieta</i>	restless flycatcher		C		2
animals	birds	Monarchidae	<i>Myiagra rubecula</i>	leaden flycatcher		C		2
animals	birds	Monarchidae	<i>Grallina cyanoleuca</i>	magpie-lark		C		49
animals	birds	Motacillidae	<i>Anthus novaeseelandiae</i>	Australasian pipit		C		17
animals	birds	Nectariniidae	<i>Dicaeum hirundinaceum</i>	mistletoebird		C		13
animals	birds	Neosittidae	<i>Daphoenositta chrysoptera</i>	varied sittella		C		1
animals	birds	Oriolidae	<i>Oriolus sagittatus</i>	olive-backed oriole		C		7
animals	birds	Otididae	<i>Ardeotis australis</i>	Australian bustard		C		24
animals	birds	Pachycephalidae	<i>Pachycephala rufiventris</i>	rufous whistler		C		20
animals	birds	Pachycephalidae	<i>Oreoica gutturalis</i>	crested bellbird		C		1
animals	birds	Pachycephalidae	<i>Colluricincla harmonica</i>	grey shrike-thrush		C		9
animals	birds	Pardalotidae	<i>Pardalotus striatus</i>	striated pardalote		C		15
animals	birds	Pardalotidae	<i>Pardalotus punctatus</i>	spotted pardalote		C		1
animals	birds	Passeridae	<i>Passer domesticus</i>	house sparrow	Y			1
animals	birds	Pelecanidae	<i>Pelecanus conspicillatus</i>	Australian pelican		C		7
animals	birds	Petroicidae	<i>Petroica rosea</i>	rose robin		C		1
animals	birds	Petroicidae	<i>Melanodryas cucullata</i>	hooded robin		C		1
animals	birds	Petroicidae	<i>Petroica goodenovii</i>	red-capped robin		C		4
animals	birds	Petroicidae	<i>Microeca fascinans</i>	jacky winter		C		7
animals	birds	Phalacrocoracidae	<i>Phalacrocorax sulcirostris</i>	little black cormorant		C		11
animals	birds	Phalacrocoracidae	<i>Microcarbo melanoleucos</i>	little pied cormorant		C		5
animals	birds	Phalacrocoracidae	<i>Phalacrocorax varius</i>	pied cormorant		C		7
animals	birds	Phalacrocoracidae	<i>Phalacrocorax carbo</i>	great cormorant		C		1
animals	birds	Phasianidae	<i>Coturnix ypsilophora</i>	brown quail		C		24
animals	birds	Phasianidae	<i>Coturnix pectoralis</i>	stubble quail		C		2
animals	birds	Podargidae	<i>Podargus strigoides</i>	tawny frogmouth		C		4
animals	birds	Podargidae	<i>Podargus ocellatus plumiferus</i>	plumed frogmouth		V		1
animals	birds	Podicipedidae	<i>Tachybaptus novaehollandiae</i>	Australasian grebe		C		9
animals	birds	Podicipedidae	<i>Podiceps cristatus</i>	great crested grebe		C		3
animals	birds	Pomatostomidae	<i>Pomatostomus temporalis</i>	grey-crowned babbler		C		20
animals	birds	Psittacidae	<i>Aprosmictus erythropterus</i>	red-winged parrot		C		28
animals	birds	Psittacidae	<i>Trichoglossus haematodus moluccanus</i>	rainbow lorikeet		C		33
animals	birds	Psittacidae	<i>Platycercus adscitus</i>	pale-headed rosella		C		33
animals	birds	Ptilonorhynchidae	<i>Ptilonorhynchus maculatus</i>	spotted bowerbird		C		21
animals	birds	Rallidae	<i>Porphyrio porphyrio</i>	purple swamphen		C		5
animals	birds	Rallidae	<i>Fulica atra</i>	Eurasian coot		C		8
animals	birds	Rallidae	<i>Gallinula tenebrosa</i>	dusky moorhen		C		4
animals	birds	Recurvirostridae	<i>Himantopus himantopus</i>	black-winged stilt		C		2

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animals	birds	Rhipiduridae	<i>Rhipidura leucophrys</i>	willie wagtail		C		46
animals	birds	Rhipiduridae	<i>Rhipidura albiscapa</i>	grey fantail		C		13
animals	birds	Scolopacidae	<i>Tringa nebularia</i>	common greenshank		C		2
animals	birds	Strigidae	<i>Ninox boobook</i>	southern boobook		C		6
animals	birds	Threskiornithidae	<i>Threskiornis molucca</i>	Australian white ibis		C		6
animals	birds	Threskiornithidae	<i>Platalea flavipes</i>	yellow-billed spoonbill		C		7
animals	birds	Threskiornithidae	<i>Platalea regia</i>	royal spoonbill		C		6
animals	birds	Threskiornithidae	<i>Plegadis falcinellus</i>	glossy ibis		C		2
animals	birds	Threskiornithidae	<i>Threskiornis spinicollis</i>	straw-necked ibis		C		9
animals	birds	Timaliidae	<i>Zosterops lateralis</i>	silveryeye		C		2
animals	birds	Turnicidae	<i>Turnix pyrrhothorax</i>	red-chested button-quail		C		2
animals	birds	Tytonidae	<i>Tyto javanica</i>	eastern barn owl		C		13
animals	bony fish	Clupeidae	<i>Nematalosa erebi</i>	bony bream				1
animals	bony fish	Eleotridae	<i>Hypseleotris compressa</i>	empire gudgeon				1
animals	bony fish	Melanotaeniidae	<i>Melanotaenia splendida splendida</i>	eastern rainbowfish				1
animals	bony fish	Percichthyidae	<i>Macquaria ambigua</i>	golden perch				1
animals	bony fish	Terapontidae	<i>Leiopotherapon unicolor</i>	spangled perch				1
animals	mammals	Canidae	<i>Canis lupus dingo</i>	dingo				1
animals	mammals	Dasyuridae	<i>Planigale tenuirostris</i>	narrow-nosed planigale		C		1
animals	mammals	Dasyuridae	<i>Sminthopsis macroura</i>	stripe-faced dunnart		C		2
animals	mammals	Emballonuridae	<i>Saccolaimus flaviventris</i>	yellow-bellied sheath-tail bat		C		2
animals	mammals	Felidae	<i>Felis catus</i>	cat	Y			4
animals	mammals	Leporidae	<i>Oryctolagus cuniculus</i>	rabbit	Y			3
animals	mammals	Macropodidae	<i>Macropus robustus</i>	common wallaroo		C		8
animals	mammals	Macropodidae	<i>Macropus giganteus</i>	eastern grey kangaroo		C		6
animals	mammals	Macropodidae	<i>Petrogale herberti</i>	Herbert's rock-wallaby		C		2
animals	mammals	Macropodidae	<i>Lagorchestes conspicillatus</i>	spectacled hare-wallaby		C		6
animals	mammals	Macropodidae	<i>Wallabia bicolor</i>	swamp wallaby		C		2
animals	mammals	Macropodidae	<i>Macropus dorsalis</i>	black-striped wallaby		C		3
animals	mammals	Muridae	<i>Rattus sp. cf. villosissimus/sordidus</i>			C		6
animals	mammals	Muridae	<i>Pseudomys gracilicaudatus</i>	eastern chestnut mouse		C		2
animals	mammals	Muridae	<i>Pseudomys delicatulus</i>	delicate mouse		C		1
animals	mammals	Muridae	<i>Rattus tunneyi</i>	pale field-rat		C		3/2
animals	mammals	Muridae	<i>Leggadina forresti</i>	Forrest's mouse		C		2
animals	mammals	Muridae	<i>Hydromys chrysogaster</i>	water rat		C		1
animals	mammals	Muridae	<i>Mus musculus</i>	house mouse	Y			8
animals	mammals	Petauridae	<i>Petaurus breviceps</i>	sugar glider		C		2
animals	mammals	Phalangeridae	<i>Trichosurus vulpecula</i>	common brushtail possum		C		3
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala		C	V	8
animals	mammals	Potoroidae	<i>Aepyprymnus rufescens</i>	rufous bettong		C		2
animals	mammals	Pseudocheiridae	<i>Petauroides volans</i>	greater glider		C		1
animals	mammals	Suidae	<i>Sus scrofa</i>	pig	Y			1
animals	mammals	Tachyglossidae	<i>Tachyglossus aculeatus</i>	short-beaked echidna		C		1
animals	mammals	Vespertilionidae	<i>Chalinolobus picatus</i>	little pied bat		NT		1
animals	mammals	Vespertilionidae	<i>Chalinolobus gouldii</i>	Gould's wattled bat		C		3/2
animals	mammals	Vespertilionidae	<i>Scotorepens greyii</i>	little broad-nosed bat		C		3

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animals	mammals	Vespertilionidae	<i>Scotorepens balstoni</i>	inland broad-nosed bat		C		3
animals	reptiles	Agamidae	<i>Diporiphora australis</i>			C		1
animals	reptiles	Carphodactylidae	<i>Nephrurus asper</i>	spiny knob-tailed gecko		C		1/1
animals	reptiles	Chelidae	<i>Chelodina longicollis</i>	eastern snake-necked turtle		C		1
animals	reptiles	Diplodactylidae	<i>Oedura marmorata</i>	marbled velvet gecko		C		1/1
animals	reptiles	Diplodactylidae	<i>Oedura monilis</i>			C		4/2
animals	reptiles	Elapidae	<i>Demansia psammophis</i>	yellow-faced whip snake		C		1
animals	reptiles	Elapidae	<i>Furina diadema</i>	red-naped snake		C		1/1
animals	reptiles	Elapidae	<i>Pseudonaja textilis</i>	eastern brown snake		C		1
animals	reptiles	Elapidae	<i>Pseudechis australis</i>	king brown snake		C		3
animals	reptiles	Elapidae	<i>Demansia vestigiata</i>	black whip snake		C		1/1
animals	reptiles	Elapidae	<i>Cryptophis boschmai</i>	Carpentaria whip snake		C		1
animals	reptiles	Elapidae	<i>Suta suta</i>	myall snake		C		1
animals	reptiles	Gekkonidae	<i>Gehyra dubia</i>			C		1/1
animals	reptiles	Gekkonidae	<i>Heteronotia binoei</i>	Bynoe's gecko		C		8/1
animals	reptiles	Pygopodidae	<i>Lialis burtonis</i>	Burton's legless lizard		C		2
animals	reptiles	Scincidae	<i>Morethia boulengeri</i>			C		2/1
animals	reptiles	Scincidae	<i>Ctenotus taeniolatus</i>	copper-tailed skink		C		1
animals	reptiles	Scincidae	<i>Cryptoblepharus pannosus</i>	ragged snake-eyed skink		C		1
animals	reptiles	Scincidae	<i>Lygisaurus foliorum</i>			C		1
animals	reptiles	Scincidae	<i>Egernia rugosa</i>	yakka skink		V	V	1
animals	reptiles	Scincidae	<i>Egernia striolata</i>	tree skink		C		2/1
animals	reptiles	Scincidae	<i>Tiliqua scincoides</i>	eastern blue-tongued lizard		C		1
animals	reptiles	Scincidae	<i>Lerista fragilis</i>			C		3/2
animals	reptiles	Scincidae	<i>Ctenotus robustus</i>			C		1
animals	reptiles	Varanidae	<i>Varanus varius</i>	lace monitor		C		3
animals	reptiles	Varanidae	<i>Varanus gouldii</i>	sand monitor		C		2
animals	reptiles	Varanidae	<i>Varanus tristis</i>	black-tailed monitor		C		2/2
plants	conifers	Cupressaceae	<i>Callitris glaucophylla</i>	white cypress pine		C		3
plants	ferns	Adiantaceae	<i>Cheilanthes sieberi</i>			C		9
plants	ferns	Adiantaceae	<i>Doryopteris concolor</i>			C		2/1
plants	ferns	Marsileaceae	<i>Marsilea hirsuta</i>	hairy nardoo		C		1
plants	higher dicots	Acanthaceae	<i>Pseuderanthemum variabile</i>	pastel flower		C		3
plants	higher dicots	Acanthaceae	<i>Brunoniella australis</i>	blue trumpet		C		3
plants	higher dicots	Acanthaceae	<i>Rostellularia adscendens</i>			C		3
plants	higher dicots	Amaranthaceae	<i>Nyssanthus erecta</i>			C		1
plants	higher dicots	Amaranthaceae	<i>Alternanthera nodiflora</i>	joyweed		C		2/1
plants	higher dicots	Amaranthaceae	<i>Amaranthus mitchellii</i>	Boggabri weed		C		1/1
plants	higher dicots	Amaranthaceae	<i>Achyranthes aspera</i>			C		5
plants	higher dicots	Amaranthaceae	<i>Alternanthera</i>			C		1
plants	higher dicots	Amaranthaceae	<i>Ptilotus</i>			C		1
plants	higher dicots	Apocynaceae	<i>Parsonsia lanceolata</i>	northern silkpod		C		1
plants	higher dicots	Apocynaceae	<i>Alstonia constricta</i>	bitterbark		C		5
plants	higher dicots	Apocynaceae	<i>Carissa ovata</i>	currantbush		C		10
plants	higher dicots	Apocynaceae	<i>Parsonsia straminea</i>	monkey rope		C		1
plants	higher dicots	Apocynaceae	<i>Marsdenia viridiflora subsp. viridiflora</i>			C		1/1

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plants	higher dicots	Apocynaceae	<i>Marsdenia viridiflora</i>			C		1
plants	higher dicots	Araliaceae	<i>Astrotricha biddulphiana</i>			C		1
plants	higher dicots	Asteraceae	<i>Parthenium hysterophorus</i>	parthenium weed	Y			2/1
plants	higher dicots	Asteraceae	<i>Coronidium oxylepis subsp. lanatum</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Wedelia spilanthis</i>			C		1
plants	higher dicots	Asteraceae	<i>Vittadinia</i>			C		1
plants	higher dicots	Asteraceae	<i>Brachyscome</i>			C		1
plants	higher dicots	Asteraceae	<i>Bidens pilosa</i>		Y			1
plants	higher dicots	Asteraceae	<i>Pluchea dunlopia</i>			C		1/1
plants	higher dicots	Asteraceae	<i>Coronidium rupicola</i>			C		1
plants	higher dicots	Asteraceae	<i>Euchiton sphaericus</i>			C		1
plants	higher dicots	Asteraceae	<i>Pterocaulon redolens</i>			C		1
plants	higher dicots	Asteraceae	<i>Cyanthillium cinereum</i>			C		2/1
plants	higher dicots	Asteraceae	<i>Leiocarpa brevicompta</i>			C		2/1
plants	higher dicots	Asteraceae	<i>Podolepis longipedata</i>	tall copper-wire daisy		C		1/1
plants	higher dicots	Bignoniaceae	<i>Pandorea pandorana</i>	wonga vine		C		1
plants	higher dicots	Boraginaceae	<i>Ehretia</i>			C		1
plants	higher dicots	Byttneriaceae	<i>Seringia corollata</i>			C		1
plants	higher dicots	Cactaceae	<i>Opuntia</i>		Y			3
plants	higher dicots	Cactaceae	<i>Opuntia stricta</i>		Y			2
plants	higher dicots	Cactaceae	<i>Opuntia tomentosa</i>	velvety tree pear	Y			1
plants	higher dicots	Cactaceae	<i>Cereus uruguayanus</i>		Y			1/1
plants	higher dicots	Caesalpiniaceae	<i>Senna artemisioides subsp. zygophylla</i>			C		1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum</i>			C		3
plants	higher dicots	Caesalpiniaceae	<i>Cassia brewsteri</i>			C		1/1
plants	higher dicots	Caesalpiniaceae	<i>Senna barclayana</i>			C		1
plants	higher dicots	Caesalpiniaceae	<i>Lysiphyllum hookeri</i>	Queensland ebony		C		2
plants	higher dicots	Campanulaceae	<i>Pratia concolor</i>	poison pratia		C		1
plants	higher dicots	Capparaceae	<i>Capparis loranthifolia</i>			C		1
plants	higher dicots	Capparaceae	<i>Apophyllum anomalum</i>	broom bush		C		1
plants	higher dicots	Capparaceae	<i>Capparis lasiantha</i>	nipan		C		4
plants	higher dicots	Casuarinaceae	<i>Casuarina cunninghamiana</i>			C		1
plants	higher dicots	Celastraceae	<i>Denhamia pittosporoides subsp. angustifolia</i>			C		1/1
plants	higher dicots	Celastraceae	<i>Denhamia oleaster</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena muricata var. muricata</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Einadia nutans subsp. linifolia</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena convexula</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Dysphania glomulifera</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena bicornis</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Maireana microphylla</i>			C		1
plants	higher dicots	Chenopodiaceae	<i>Enchylaena tomentosa</i>			C		3
plants	higher dicots	Chenopodiaceae	<i>Einadia polygonoides</i>	knotweed goosefoot		C		1/1
plants	higher dicots	Chenopodiaceae	<i>Atriplex eardleyae</i>			C		1/1
plants	higher dicots	Chenopodiaceae	<i>Atriplex muelleri</i>	lagoon saltbush		C		3
plants	higher dicots	Chenopodiaceae	<i>Salsola kali</i>			C		3
plants	higher dicots	Chenopodiaceae	<i>Einadia nutans</i>			C		5

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plants	higher dicots	Chenopodiaceae	<i>Einadia hastata</i>			C		2/1
plants	higher dicots	Chenopodiaceae	<i>Sclerolaena</i>			C		2
plants	higher dicots	Chenopodiaceae	<i>Maireana</i>			C		1
plants	higher dicots	Cleomaceae	<i>Cleome viscosa</i>	tick-weed		C		1/1
plants	higher dicots	Combretaceae	<i>Macropteranthus leichhardtii</i>	bonewood		C		3
plants	higher dicots	Combretaceae	<i>Terminalia oblongata</i>			C		1
plants	higher dicots	Convolvulaceae	<i>Ipomoea lonchophylla</i>			C		1/1
plants	higher dicots	Convolvulaceae	<i>Evolvulus alsinoides</i>			C		5
plants	higher dicots	Ebenaceae	<i>Diospyros humilis</i>	small-leaved ebony		C		4/1
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum australe</i>	cocaine tree		C		5/1
plants	higher dicots	Erythroxylaceae	<i>Erythroxylum sp. (Splityard Creek L.Pedley 5360)</i>			C		4
plants	higher dicots	Euphorbiaceae	<i>Adriana urticoides</i> var. <i>urticoides</i>			C		1/1
plants	higher dicots	Euphorbiaceae	<i>Chamaesyce drummondii</i>	caustic-weed		C		4
plants	higher dicots	Euphorbiaceae	<i>Euphorbia stevenii</i>	bottle tree spurge		C		1/1
plants	higher dicots	Euphorbiaceae	<i>Euphorbia</i>			C		3
plants	higher dicots	Euphorbiaceae	<i>Acalypha eremorum</i>	soft acalypha		C		1
plants	higher dicots	Euphorbiaceae	<i>Ricinocarpus linearifolius</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Zornia</i>			C		1/1
plants	higher dicots	Fabaceae	<i>Tephrosia</i>			C		1
plants	higher dicots	Fabaceae	<i>Cullen tenax</i>	emu-foot		C		1
plants	higher dicots	Fabaceae	<i>Crotalaria incana</i> subsp. <i>incana</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Desmodium rhytidophyllum</i>			C		2
plants	higher dicots	Fabaceae	<i>Zornia pallida</i>			NT		1/1
plants	higher dicots	Fabaceae	<i>Glycine cyrtoloba</i>			C		2
plants	higher dicots	Fabaceae	<i>Centrosema pascuorum</i>		Y			1/1
plants	higher dicots	Fabaceae	<i>Glycine tabacina</i>	glycine pea		C		1
plants	higher dicots	Fabaceae	<i>Hovea lanceolata</i>			C		4
plants	higher dicots	Goodeniaceae	<i>Goodenia paniculata</i>			C		2/1
plants	higher dicots	Goodeniaceae	<i>Goodenia rotundifolia</i>			C		1
plants	higher dicots	Haloragaceae	<i>Gonocarpus</i>			C		1
plants	higher dicots	Haloragaceae	<i>Gonocarpus elatus</i>			C		2/1
plants	higher dicots	Lamiaceae	<i>Ajuga australis</i>	Australian bugle		C		1
plants	higher dicots	Lamiaceae	<i>Basilicum polystachyon</i>			C		1
plants	higher dicots	Malvaceae	<i>Malvastrum coromandelianum</i>	prickly malvastrum	Y			1
plants	higher dicots	Malvaceae	<i>Hibiscus krichauffianus</i>			C		2
plants	higher dicots	Malvaceae	<i>Gossypium sturtianum</i>			C		1/1
plants	higher dicots	Malvaceae	<i>Sida atherophora</i>			C		3/1
plants	higher dicots	Malvaceae	<i>Hibiscus sturtii</i>			C		5
plants	higher dicots	Malvaceae	<i>Abutilon oxycarpum</i> var. <i>oxycarpum</i>			C		2/1
plants	higher dicots	Malvaceae	<i>Sida cordifolia</i>		Y			1
plants	higher dicots	Malvaceae	<i>Sida</i>			C		1
plants	higher dicots	Malvaceae	<i>Malvastrum americanum</i> var. <i>americanum</i>		Y			2
plants	higher dicots	Malvaceae	<i>Sida filiformis</i>			C		4
plants	higher dicots	Meliaceae	<i>Owenia acidula</i>	emu apple		C		1
plants	higher dicots	Mimosaceae	<i>Acacia julifera</i>			C		1
plants	higher dicots	Mimosaceae	<i>Acacia conferta</i>			C		1

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plants	higher dicots	Mimosaceae	<i>Acacia ixodes</i>			C		2/1
plants	higher dicots	Mimosaceae	<i>Acacia decora</i>	pretty wattle		C		1
plants	higher dicots	Mimosaceae	<i>Acacia</i>			C		3/2
plants	higher dicots	Mimosaceae	<i>Acacia salicina</i>	doolan		C		1
plants	higher dicots	Mimosaceae	<i>Acacia shirleyi</i>	lancewood		C		3
plants	higher dicots	Mimosaceae	<i>Acacia fodinalis</i>			C		5
plants	higher dicots	Mimosaceae	<i>Acacia catenulata</i>	bendee		C		2
plants	higher dicots	Mimosaceae	<i>Acacia farnesiana</i>	mimosa bush		C		1
plants	higher dicots	Mimosaceae	<i>Acacia harpophylla</i>	brigalow		C		8
plants	higher dicots	Mimosaceae	<i>Acacia longispicata</i>			C		4/4
plants	higher dicots	Mimosaceae	<i>Acacia bancroftiorum</i>			C		3/2
plants	higher dicots	Mimosaceae	<i>Archidendropsis basaltica</i>	red lancewood		C		1
plants	higher dicots	Mimosaceae	<i>Acacia cretata</i> x <i>A.fodinalis</i>			C		1/1
plants	higher dicots	Mimosaceae	<i>Leucaena leucocephala</i> subsp. <i>glabrata</i>		Y			1/1
plants	higher dicots	Mimosaceae	<i>Acacia</i> sp. (Comet L.Pedley 4091)			C		1
plants	higher dicots	Myoporaceae	<i>Eremophila maculata</i>			C		1
plants	higher dicots	Myoporaceae	<i>Eremophila mitchellii</i>			C		9
plants	higher dicots	Myoporaceae	<i>Eremophila latrobei</i>			C		1
plants	higher dicots	Myoporaceae	<i>Eremophila deserti</i>			C		3/2
plants	higher dicots	Myrtaceae	<i>Melaleuca trichostachya</i>			C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus melanophloia</i> subsp. <i>melanophloia</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus melanophloia</i>			C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus tholiformis</i>			C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus orgadophila</i>	mountain coolibah		C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus decorticans</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia erythrophloia</i>	variable-barked bloodwood		C		2/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus thozetiana</i>			C		3
plants	higher dicots	Myrtaceae	<i>Eucalyptus microtheca</i>	coolibah		C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus cambageana</i>	Dawson gum		C		5/2
plants	higher dicots	Myrtaceae	<i>Corymbia leichhardtii</i>	rustyjacket		C		4
plants	higher dicots	Myrtaceae	<i>Melaleuca acacioides</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Eucalyptus populnea</i>	poplar box		C		1
plants	higher dicots	Myrtaceae	<i>Eucalyptus coolabah</i>	coolabah		C		2
plants	higher dicots	Myrtaceae	<i>Corymbia citriodora</i>	spotted gum		C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus crebra</i>	narrow-leaved red ironbark		C		2
plants	higher dicots	Myrtaceae	<i>Eucalyptus camaldulensis</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia</i>			C		1
plants	higher dicots	Myrtaceae	<i>Corymbia citriodora</i> subsp. <i>citriodora</i>			C		1/1
plants	higher dicots	Myrtaceae	<i>Leptospermum lamellatum</i>			C		3
plants	higher dicots	Nyctaginaceae	<i>Boerhavia pubescens</i>			C		1/1
plants	higher dicots	Oleaceae	<i>Jasminum didymum</i>			C		4
plants	higher dicots	Oxalidaceae	<i>Oxalis</i>			C		2/1
plants	higher dicots	Passifloraceae	<i>Passiflora aurantia</i>			C		1
plants	higher dicots	Pentapetaceae	<i>Melhania oblongifolia</i>			C		1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus virgatus</i>			C		3
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus lacunarius</i>			C		1/1

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plants	higher dicots	Phyllanthaceae	<i>Sauropus trachyspermus</i>			C		1/1
plants	higher dicots	Phyllanthaceae	<i>Breynia oblongifolia</i>			C		1
plants	higher dicots	Phyllanthaceae	<i>Phyllanthus</i>			C		3
plants	higher dicots	Phyllanthaceae	<i>Bridelia leichhardtii</i>			C		1
plants	higher dicots	Picrodendraceae	<i>Petalostigma pubescens</i>	quinine tree		C		2
plants	higher dicots	Pittosporaceae	<i>Pittosporum spinescens</i>			C		1
plants	higher dicots	Pittosporaceae	<i>Bursaria incana</i>			C		2
plants	higher dicots	Polygonaceae	<i>Muehlenbeckia</i>			C		1
plants	higher dicots	Polygonaceae	<i>Muehlenbeckia florulenta</i>	lignum		C		1
plants	higher dicots	Portulacaceae	<i>Portulaca oleracea</i>	pigweed	Y			3
plants	higher dicots	Portulacaceae	<i>Portulaca</i>			C		1
plants	higher dicots	Proteaceae	<i>Grevillea floribunda subsp. floribunda</i>			C		1/1
plants	higher dicots	Rhamnaceae	<i>Alphitonia excelsa</i>	soap tree		C		8
plants	higher dicots	Rhamnaceae	<i>Ventilago viminalis</i>	supplejack		C		1
plants	higher dicots	Rubiaceae	<i>Psydrax oleifolia</i>			C		1
plants	higher dicots	Rubiaceae	<i>Everistia vacciniifolia</i>			C		1
plants	higher dicots	Rubiaceae	<i>Pogonolobus reticulatus</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax johnsonii</i>			C		1
plants	higher dicots	Rubiaceae	<i>Psydrax odorata</i>			C		1
plants	higher dicots	Rubiaceae	<i>Oldenlandia coerulescens</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Flindersia dissosperma</i>			C		2/2
plants	higher dicots	Rutaceae	<i>Philotheca difformis subsp. difformis</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Boronia foetida</i>			C		1/1
plants	higher dicots	Rutaceae	<i>Geijera parviflora</i>	wilga		C		3
plants	higher dicots	Sapindaceae	<i>Atalaya hemiglauca</i>			C		3
plants	higher dicots	Scrophulariaceae	<i>Scoparia dulcis</i>	Scoparia	Y			1
plants	higher dicots	Solanaceae	<i>Solanum semiaratum</i>	prickly nightshade		C		3
plants	higher dicots	Solanaceae	<i>Solanum parvifolium</i>			C		1
plants	higher dicots	Solanaceae	<i>Solanum ellipticum</i>	potato bush		C		8
plants	higher dicots	Solanaceae	<i>Solanum ferocissimum</i>			C		1/1
plants	higher dicots	Solanaceae	<i>Solanum seaforthianum</i>	Brazilian nightshade	Y			1
plants	higher dicots	Solanaceae	<i>Solanum mitchellianum</i>			C		1/1
plants	higher dicots	Sparrmanniaceae	<i>Grewia latifolia</i>	dysentery plant		C		3
plants	higher dicots	Sterculiaceae	<i>Brachychiton rupestris</i>			C		4
plants	higher dicots	Sterculiaceae	<i>Brachychiton australis</i>	broad-leaved bottle tree		C		2
plants	higher dicots	Sterculiaceae	<i>Brachychiton populneus subsp. trilobus</i>			C		1/1
plants	higher dicots	Violaceae	<i>Hybanthus monopetalus</i>			C		1
plants	higher dicots	Zygophyllaceae	<i>Roepera apiculata</i>			C		1
plants	monocots	Cyperaceae	<i>Eleocharis</i>			C		1
plants	monocots	Cyperaceae	<i>Fimbristylis</i>			C		1
plants	monocots	Cyperaceae	<i>Eleocharis philippinensis</i>			C		1/1
plants	monocots	Cyperaceae	<i>Scleria mackaviensis</i>			C		4
plants	monocots	Cyperaceae	<i>Scleria sphacelata</i>			C		3
plants	monocots	Cyperaceae	<i>Cyperus squarrosus</i>	bearded flatsedge		C		1/1
plants	monocots	Cyperaceae	<i>Cyperus clarus</i>			V		1/1
plants	monocots	Cyperaceae	<i>Cyperus fulvus</i>			C		2

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plants	monocots	Cyperaceae	<i>Schoenus kennyi</i>			C		2/1
plants	monocots	Cyperaceae	<i>Cyperus gracilis</i>			C		2
plants	monocots	Cyperaceae	<i>Cyperus procerus</i>			C		1/1
plants	monocots	Cyperaceae	<i>Cyperus rotundus</i>	nutgrass	Y			2/1
plants	monocots	Cyperaceae	<i>Cyperus bowmannii</i>			C		5
plants	monocots	Cyperaceae	<i>Cyperus exaltatus</i>	tall flatsedge		C		2/1
plants	monocots	Cyperaceae	<i>Cyperus dactyloides</i>			C		1/1
plants	monocots	Hemerocallidaceae	<i>Dianella longifolia</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra confertifolia</i>			C		1
plants	monocots	Laxmanniaceae	<i>Lomandra multiflora</i>			C		2
plants	monocots	Laxmanniaceae	<i>Lomandra longifolia</i>			C		4
plants	monocots	Laxmanniaceae	<i>Lomandra multiflora subsp. multiflora</i>			C		1/1
plants	monocots	Poaceae	<i>Paspalidium globoideum</i>	sago grass		C		1
plants	monocots	Poaceae	<i>Paspalidium jubiflorum</i>	warrego grass		C		1/1
plants	monocots	Poaceae	<i>Thyridolepis xerophila</i>			C		1/1
plants	monocots	Poaceae	<i>Ancistrachne uncinulata</i>	hooky grass		C		1
plants	monocots	Poaceae	<i>Dactyloctenium radulans</i>	button grass		C		1
plants	monocots	Poaceae	<i>Eragrostis megalosperma</i>			C		2
plants	monocots	Poaceae	<i>Eragrostis spartinoides</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium caespitosum</i>	brigalow grass		C		3
plants	monocots	Poaceae	<i>Sporobolus actinocladus</i>	katoora grass		C		2
plants	monocots	Poaceae	<i>Paspalidium albobillosum</i>			C		4/1
plants	monocots	Poaceae	<i>Cymbopogon queenslandicus</i>			C		1
plants	monocots	Poaceae	<i>Thyridolepis mitchelliana</i>	mulga mitchell grass		C		1/1
plants	monocots	Poaceae	<i>Eriochloa pseudoacrotricha</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida benthamii var. benthamii</i>			C		3
plants	monocots	Poaceae	<i>Chloris divaricata var. divaricata</i>	slender chloris		C		6
plants	monocots	Poaceae	<i>Dichanthium sericeum subsp. sericeum</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida queenslandica var. dissimilis</i>			C		5
plants	monocots	Poaceae	<i>Panicum queenslandicum var. queenslandicum</i>			C		1/1
plants	monocots	Poaceae	<i>Panicum</i>			C		1
plants	monocots	Poaceae	<i>Sorghum</i>			C		1
plants	monocots	Poaceae	<i>Aristida</i>			C		5
plants	monocots	Poaceae	<i>Paspalum</i>			C		1
plants	monocots	Poaceae	<i>Cymbopogon</i>			C		1
plants	monocots	Poaceae	<i>Enneapogon</i>			C		2
plants	monocots	Poaceae	<i>Eragrostis</i>			C		1
plants	monocots	Poaceae	<i>Paspalidium</i>			C		1
plants	monocots	Poaceae	<i>Eulalia aurea</i>	silky browntop		C		1
plants	monocots	Poaceae	<i>Melinis repens</i>	red natal grass	Y			10
plants	monocots	Poaceae	<i>Aristida ramosa</i>	purple wiregrass		C		5/1
plants	monocots	Poaceae	<i>Chloris virgata</i>	feathertop rhodes grass	Y			2
plants	monocots	Poaceae	<i>Eriachne obtusa</i>			C		1
plants	monocots	Poaceae	<i>Panicum effusum</i>			C		3
plants	monocots	Poaceae	<i>Setaria surgens</i>			C		1
plants	monocots	Poaceae	<i>Eriochloa crebra</i>	spring grass		C		3

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plants	monocots	Poaceae	<i>Themeda triandra</i>	kangaroo grass		C		2
plants	monocots	Poaceae	<i>Entolasia stricta</i>	wiry panic		C		7
plants	monocots	Poaceae	<i>Sporobolus caroli</i>	fairy grass		C		6
plants	monocots	Poaceae	<i>Thellungia advena</i>	coolibah grass		C		1
plants	monocots	Poaceae	<i>Aristida benthamii</i>			C		1/1
plants	monocots	Poaceae	<i>Aristida holathera</i>			C		1
plants	monocots	Poaceae	<i>Aristida latifolia</i>	feathertop wiregrass		C		2
plants	monocots	Poaceae	<i>Aristida leptopoda</i>	white speargrass		C		2
plants	monocots	Poaceae	<i>Astrebla squarrosa</i>	bull mitchell grass		C		4/1
plants	monocots	Poaceae	<i>Chrysopogon fallax</i>			C		3
plants	monocots	Poaceae	<i>Eragrostis sororia</i>			C		4/1
plants	monocots	Poaceae	<i>Eriachne mucronata</i>			C		1
plants	monocots	Poaceae	<i>Pennisetum ciliare</i>			C		12
plants	monocots	Poaceae	<i>Triodia mitchellii</i>	buck spinifex		C		2/1
plants	monocots	Poaceae	<i>Aristida gracilipes</i>			C		1
plants	monocots	Poaceae	<i>Digitaria ammophila</i>	silky umbrella grass		C		1
plants	monocots	Poaceae	<i>Digitaria ramularis</i>			C		3
plants	monocots	Poaceae	<i>Enneapogon gracilis</i>	slender nineawn		C		1
plants	monocots	Poaceae	<i>Eragrostis speciosa</i>			C		2
plants	monocots	Poaceae	<i>Eriochloa fatmensis</i>			C		2
plants	monocots	Poaceae	<i>Leptochloa digitata</i>			C		1
plants	monocots	Poaceae	<i>Megathyrsus maximus</i>		Y			3
plants	monocots	Poaceae	<i>Paspalidium gracile</i>	slender panic		C		7
plants	monocots	Poaceae	<i>Tragus australianus</i>	small burr grass		C		1
plants	monocots	Poaceae	<i>Aristida longicollis</i>			C		1/1
plants	monocots	Poaceae	<i>Cymbopogon refractus</i>	barbed-wire grass		C		2
plants	monocots	Poaceae	<i>Dichanthium fecundum</i>	curly bluegrass		C		1
plants	monocots	Poaceae	<i>Dichanthium sericeum</i>			C		6
plants	monocots	Poaceae	<i>Digitaria parviflora</i>			C		5
plants	monocots	Poaceae	<i>Eragrostis lacunaria</i>	purple lovegrass		C		4
plants	monocots	Poaceae	<i>Leptochloa decipiens</i>			C		4
plants	monocots	Poaceae	<i>Panicum decompositum</i>			C		6
plants	monocots	Poaceae	<i>Sorghum x drummondii</i>		Y			1/1
plants	monocots	Poaceae	<i>Sporobolus scabridus</i>			C		1
plants	monocots	Poaceae	<i>Tripogon loliiformis</i>	five minute grass		C		1
plants	monocots	Poaceae	<i>Cymbopogon bombycinus</i>	silky oilgrass		C		1
plants	monocots	Poaceae	<i>Digitaria breviglumis</i>			C		1
plants	monocots	Poaceae	<i>Heteropogon contortus</i>	black speargrass		C		3
plants	monocots	Poaceae	<i>Iseilema vaginiflorum</i>	red flinders grass		C		1
plants	monocots	Poaceae	<i>Sporobolus mitchellii</i>	rat's tail couch		C		1/1
plants	monocots	Poaceae	<i>Alloteropsis semialata</i>	cockatoo grass		C		1
plants	monocots	Poaceae	<i>Aristida caput-medusae</i>			C		2
plants	monocots	Poaceae	<i>Bothriochloa ewartiana</i>	desert bluegrass		C		5/1
plants	monocots	Poaceae	<i>Enneapogon lindleyanus</i>			C		5/1
plants	monocots	Poaceae	<i>Enneapogon polyphyllus</i>	leafy nineawn		C		3/2
plants	monocots	Poaceae	<i>Enteropogon acicularis</i>	curly windmill grass		C		3

Kingdom	Class	Family	Scientific Name	Common Name	I	Q	A	Records
plants	monocots	Poaceae	<i>Enteropogon unispiceus</i>			C		2
plants	monocots	Poaceae	<i>Panicum queenslandicum</i>			C		1

CODES

I - Y indicates that the taxon is introduced to Queensland and has naturalised.

Q - Indicates the Queensland conservation status of each taxon under the *Nature Conservation Act 1992*. The codes are Extinct in the Wild (PE), Endangered (E), Vulnerable (V), Near Threatened (NT), Least Concern (C) or Not Protected ().

A - Indicates the Australian conservation status of each taxon under the *Environment Protection and Biodiversity Conservation Act 1999*. The values of EPBC are Conservation Dependent (CD), Critically Endangered (CE), Endangered (E), Extinct (EX), Extinct in the Wild (XW) and Vulnerable (V).

Records – The first number indicates the total number of records of the taxon for the record option selected (i.e. All, Confirmed or Specimens).

This number is output as 99999 if it equals or exceeds this value. The second number located after the / indicates the number of specimen records for the taxon.

This number is output as 999 if it equals or exceeds this value.



Australian Government

Department of Sustainability, Environment,
Water, Population and Communities

EPBC Act Protected Matters Report: Coordinates

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 about the EPBC Act including significance guidelines, forms and application process details can be found at <http://www.environment.gov.au/epbc/assessmentsapprovals/index.html>

Report created: 29/09/11 09:09:57

[Summary](#)

[Details](#)

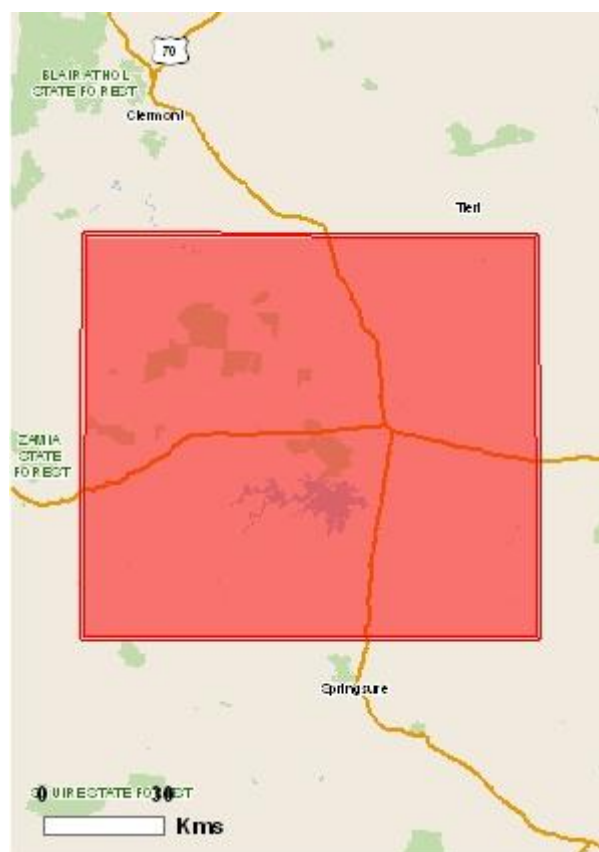
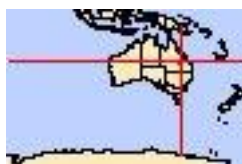
[Matters of NES](#)

[Other matters protected by
the EPBC Act](#)

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



This map may contain data which are
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[Coordinates](#)

Buffer: 1.0Km

Summary

Matters of National Environmental Significance

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

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Significance (Ramsar Wetlands):	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Areas:	None
Threatened Ecological Communities:	5
Threatened Species:	18
Migratory Species:	12

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. Information on the new heritage laws can be found at <http://www.environment.gov.au/heritage/index.html>

Please note that the current dataset on Commonwealth land is not complete. Further information on Commonwealth land would need to be obtained from relevant sources including Commonwealth agencies, local agencies, and land tenure maps.

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species. Information on EPBC Act permit requirements and application forms can be found at <http://www.environment.gov.au/epbc/permits/index.html>.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	11
Whales and Other Cetaceans:	None

Critical Habitats:	None
Commonwealth Reserves:	None

Report Summary for Extra Information

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

Place on the RNE:	3
State and Territory Reserves:	9
Regional Forest Agreements:	None
Invasive Species:	12
Nationally Important Wetlands:	1

Details

Matters of National Environmental Significance

Threatened Ecological Communities [[Resource Information](#)]

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

Name	Status	Type of Presence
Brigalow (Acacia harpophylla dominant and co-dominant)	Endangered	Community known to occur within area
Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions	Endangered	Community likely to occur within area
Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin	Endangered	Community likely to occur within area
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions	Endangered	Community likely to occur within area
Weeping Myall Woodlands	Endangered	Community likely to occur within area

Threatened Species [[Resource Information](#)]

Name	Status	Type of Presence
BIRDS		
Erythroriorchis radiatus		
Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
Geophaps scripta scripta		
Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
Neochmia ruficauda ruficauda		
Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area

[Rostratula australis](#)Australian Painted Snipe
[77037]

Vulnerable

Species or species habitat may occur within area

MAMMALS[Dasyurus hallucatus](#)

Northern Quoll [331]

Endangered

Species or species habitat likely to occur within area

[Nyctophilus timoriensis \(South-eastern form\)](#)Greater Long-eared Bat,
South-eastern Long-eared Bat
[66888]

Vulnerable

Species or species habitat may occur within area

PLANTS[Aristida annua](#)

[17906]

Vulnerable

Species or species habitat likely to occur within area

[Cadellia pentastylis](#)

Ooline [9828]

Vulnerable

Species or species habitat likely to occur within area

[Dichanthium queenslandicum](#)

King Blue-grass [5481]

Vulnerable

Species or species habitat likely to occur within area

[Digitaria porrecta](#)

Finger Panic Grass [12768]

Endangered

Species or species habitat likely to occur within area

[Marsdenia brevifolia](#)

[64585]

Vulnerable

Species or species habitat likely to occur within area

REPTILES[Delma torquata](#)

Collared Delma [1656]

Vulnerable

Species or species habitat may occur within area

[Denisonia maculata](#)

Ornamental Snake [1193]

Vulnerable

Species or species habitat known to occur within area

[Egernia rugosa](#)

Yakka Skink [1420]

Vulnerable

Species or species habitat known to occur within area

[Furina dunmali](#)

Dunmall's Snake [59254]

Vulnerable

Species or species habitat may occur within area

[Lerista allanae](#)Allan's Lerista, Retro Slider
[1378]

Endangered

Species or species habitat likely to occur within area

[Paradelma orientalis](#)

Brigalow Scaly-foot [59134]

Vulnerable

Species or species habitat likely to occur within area

[Rheodytes leukops](#)Fitzroy River Turtle, Fitzroy
Tortoise, Fitzroy Turtle [1761]

Vulnerable

Species or species habitat may occur within area

Migratory Species**[Resource Information]**

Name

Status

Type of Presence

Migratory Marine Birds[Apus pacificus](#)

Fork-tailed Swift [678]

Species or species habitat may occur within area

[Ardea alba](#)Great Egret, White Egret
[59541]

Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542]

Species or species habitat may occur within area

Migratory Terrestrial Species[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle [943]

Species or species habitat likely to occur within area

[Hirundapus caudacutus](#)

White-throated Needletail [682]

Species or species habitat may occur within area

[Merops ornatus](#)

Rainbow Bee-eater [670]

Species or species habitat may occur within area

[Myiagra cyanoleuca](#)

Satin Flycatcher [612]

Species or species habitat likely to occur within area

Migratory Wetlands Species[Ardea alba](#)Great Egret, White Egret
[59541]

Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542]

Species or species habitat may occur within area

[Gallinago hardwickii](#)Latham's Snipe, Japanese Snipe
[863]

Species or species habitat may occur within area

[Nettapus coromandelianus albipennis](#)Australian Cotton Pygmy-goose
[25979]

Species or species habitat may occur within area

[Rostratula benghalensis s. lat.](#)

Painted Snipe [889]

Vulnerable*

Species or species habitat may occur within area

Other Matters Protected by the EPBC Act**Listed Marine Species****[Resource Information]****Name****Status****Type of Presence****Birds**[Anseranas semipalmata](#)

Magpie Goose [978]

Species or species habitat may occur within area

[Apus pacificus](#)

Fork-tailed Swift [678]

Species or species habitat may occur within area

[Ardea alba](#)Great Egret, White Egret
[59541]

Species or species habitat may occur within area

[Ardea ibis](#)

Cattle Egret [59542]

Species or species habitat may occur within area

[Gallinago hardwickii](#)Latham's Snipe, Japanese Snipe
[863]

Species or species habitat may occur within area

[Haliaeetus leucogaster](#)

White-bellied Sea-Eagle [943]

Species or species habitat likely to occur within area

[Hirundapus caudacutus](#)

White-throated Needletail [682]

Species or species habitat may occur within area

[Merops ornatus](#)

Rainbow Bee-eater [670]

Species or species habitat may occur within area

[Myiagra cyanoleuca](#)

Satin Flycatcher [612]

Species or species habitat likely to occur within area

[Nettapus coromandelianus albigenis](#)Australian Cotton Pygmy-goose
[25979]

Species or species habitat may occur within area

[Rostratula benghalensis s. lat.](#)

Painted Snipe [889]

Vulnerable*

Species or species habitat may occur within area

Extra Information**Places on the RNE****[Resource Information]**

Note that not all Indigenous sites may be listed.

Name**Status****Natural**[Minerva Hills QLD](#)

Indicative Place

Indigenous[Wills Massacre Site QLD](#)

Indicative Place

Historic[Emerald Railway Station QLD](#)

Registered

State and Territory Reserves**[Resource Information]**

Caroa Island Paddock, QLD

Henellen, QLD

Snake Range, QLD

Southernwood, QLD

Ramboda, QLD

Goonderoo, QLD

Mount Leura, QLD

Avocet, QLD

Rifle Range, QLD

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 Resources Audit, 2001.

Name**Status****Type of Presence****Frogs**[Bufo marinus](#)

Cane Toad [1772]

Species or species habitat likely to occur within area

Mammals[Felis catus](#)Cat, House Cat, Domestic Cat
[19]

Species or species habitat likely to occur within area

[Oryctolagus cuniculus](#)

Rabbit, European Rabbit [128]

Species or species habitat likely to occur within area

[Sus scrofa](#)

Pig [6]	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	
Acacia nilotica subsp. indica Prickly Acacia [6196]	Species or species habitat may occur within area
Cryptostegia grandiflora Rubber Vine, Rubbervine, India Rubber Vine, India Rubbervine, Palay Rubbervine, Purple Allamanda [18913]	Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]	Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]	Species or species habitat likely to occur within area
Parkinsonia aculeata Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]	Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]	Species or species habitat likely to occur within area
Tamarix aphylla Athel Pine, Athel Tree, Tamarisk, Athel Tamarisk, Athel Tamarix, Desert Tamarisk, Flowering Cypress, Salt Cedar [16018]	Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Fairbairn Dam, QLD	

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.

Coordinates

-23.0953 147.4799,-23.10104 148.4933,-23.99733 148.4992,-23.99781 147.4747,-23.0953 147.4799

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](#)
- 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.

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Appendix B Stream Morphology Summary



Photo Plate 8 Ephemeral 4th order stream (TAS 1)



Photo Plate 9 Lacustrine System (TAS 3)



Photo Plate 10 Pastoral Dam on 1st order stream (TAS 4)



Photo Plate 11 Ephemeral 4th Order Stream (TAS 5)



Photo Plate 12 Dam on drainage line to Retreat Creek (TAS 6)



Photo Plate 13 Ephemeral 2nd order stream (TAS7)



Photo Plate 14 Ephemeral floodplain wetland (TAS8)



Photo Plate 15 Ephemeral 1st order stream (TAS9)



Photo Plate 16 Ephemeral 1st order stream (TAS10)

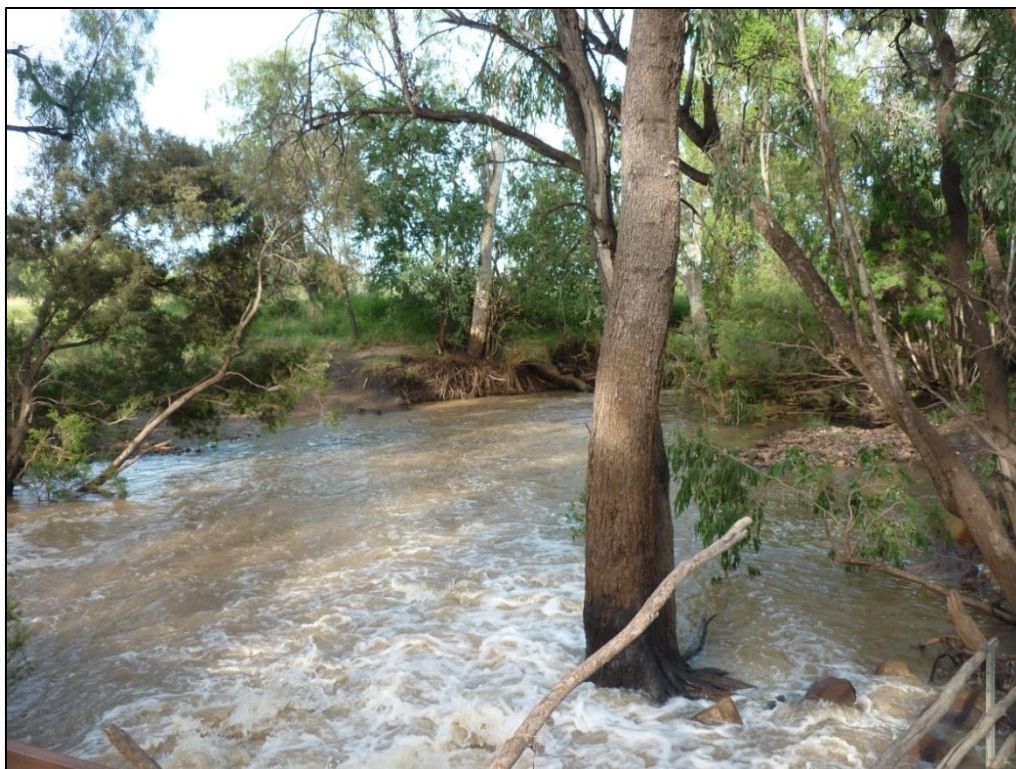


Photo Plate 17 Ephemeral 4th order stream (AQ1)

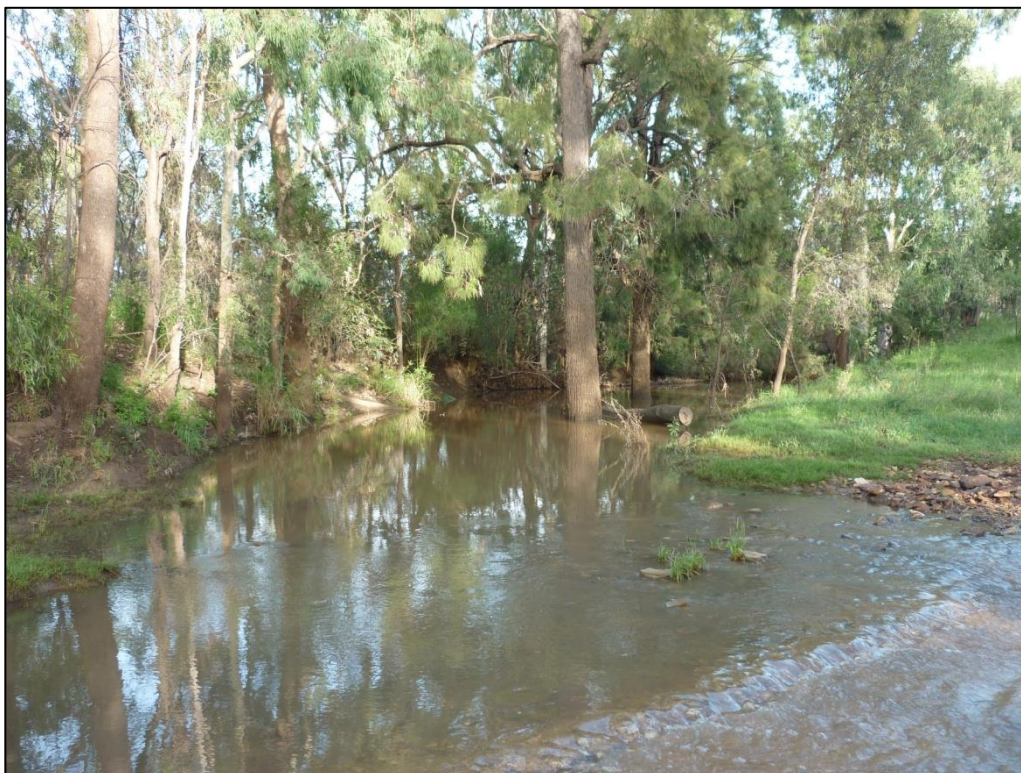


Photo Plate 18 Ephemeral 4th order stream (AQ2)



Photo Plate 19 Ephemeral 4th order stream (AQ5)



Photo Plate 20 Ephemeral 2nd order stream (AQ7)



Photo Plate 21 Palustrine Wetland (AQ8)



Photo Plate 22 Ephemeral 1st order stream (AQ9)



Photo Plate 23 Ephemeral 1st order stream (AQ11)



Photo Plate 24 Lacustrine Wetland (AQ3)



Photo Plate 25 Lacustrine Wetland (AQ13)

Appendix C Surface Water Quality Results

Summary of Surface Water Data

Note on nomenclature TAS – Dry Season Sampling, AQ – Wet Season Sampling

ND = No data is available typically because the sampling site was dry at the time of sampling.

Event No.	Location	Date	Field pH (pH Units)	Field Temp (°C)	Field DO (%)	Field EC (µs/cm)	Field TDS (ppm)	Field ORP (mv)	Lab pH (pH Units)	TDS (mg/L)	EC (µs/cm)	Sulphate (mg/L)	Dissolved Hg (mg/L)	Recoverable Hg (mg/L)
1	TAS 1	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 3	27/09/2011	9.62	24.6	82.2	175.4	115.05	-1.8	9.54	ND	158	1	ND	0.0001
	TAS 4	27/09/2011	8.05	21.6	65.8	1381	962	44.5	7.26	ND	1450	20	0.0001	0.0001
	TAS 5	27/09/2011	8	20.3	56.7	659	468	26.4	7.95	ND	735	28	0.0001	0.0001
	TAS 6	28/09/2011	8.15	21.8	46.6	229.9	155.35	37.4	7.85	ND	246	1	0.0001	0.0001
	TAS 7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 10	29/09/2011	9.17	23.9	111.3	4206	2795	12.8	9.06	ND	4270	82	0.0001	0.0001
	TAS 11	29/09/2011	8.95	20.8	60.5	2008	1417	-1.2	8.9	ND	2230	24	0.0001	0.0001
	TAS 12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2	AQ1	3/03/2012	7.78	27.3	68.3	358.6	240.262	-179.4	ND	242	ND	1	0.0001	0.0001
	AQ2	3/03/2012	7.6	26.8	28.5	233.3	156.11	-218.8	ND	159	ND	1	0.0001	0.0001
	AQ3	1/03/2012	ND	ND	ND	ND	ND	ND	ND	167	ND	1	0.0001	0.0001
	AQ4	4/03/2012	8.3	24.9	66	211	141.37	-269	ND	170	ND	1	0.0001	0.0001
	AQ5	1/03/2012	7.83	26.6	78.7	298.3	199.861	-211.3	ND	220	ND	1	0.0001	0.0001



Event No.	Location	Date	Field pH (pH Units)	Field Temp (°C)	Field DO (%)	Field EC (µs/cm)	Field TDS (ppm)	Field ORP (mv)	Lab pH (pH Units)	TDS (mg/L)	EC (µs/cm)	Sulphate (mg/L)	Dissolved Hg (mg/L)	Recoverable Hg (mg/L)
	AQ6	1/03/2012	7.72	26.4	82.5	290.8	194.836	-199.2	ND	219	ND	1	0.0001	0.0001
	AQ7	2/03/2012	9.13	30.9	125.2	733	491.11	-194.4	ND	432	ND	1	0.0001	0.0001
	AQ8	29/02/2012	6.94	31.8	51	224.4	150.348	-202.4	ND	165	ND	1	0.0001	0.0001
	AQ10	2/03/2012	8.77	26.6	90.7	877	587.59	-186.9	ND	513	ND	1	0.0001	0.0001
	AQ11	3/03/2012	8.64	26.1	52.1	3793	2541.31	-201.4	ND	2300	ND	20	0.0001	0.0001
	AQ13	29/02/2012	7.57	27.7	63	268.7	180.029	176.5	ND	144	ND	1	0.0001	0.0001
3	TAS1	4/06/2012	8	15.5	107	729	ND	49.1	ND	ND	ND	87	0.0001	0.0001
	TAS2	4/06/2012	7.48	16.6	75.1	475.6	ND	28.3	ND	ND	ND	1	0.0001	0.0001
	TAS3	4/06/2012	8.47	17.1	89.5	216.7	ND	21.1	ND	ND	ND	1	0.0001	0.0001
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	8.19	13.2	9.6	1244	ND	30	ND	ND	ND	1	0.0001	0.0001
	TAS8	4/06/2012	8.2	17.1	129	410.6	ND	3.3	ND	ND	ND	1	0.0001	0.0001
	TAS9	4/06/2012	8.3	15.5	110.3	1607	ND	12.7	ND	ND	ND	1	0.0001	0.0001
	TAS10	4/06/2012	8.23	16.8	207.2	1572	ND	30.8	ND	ND	ND	1	0.0001	0.0001
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	7.84	17.6	104.5	252.8	ND	25.7	ND	ND	ND	1	0.0001	0.0001
	TAS14	4/06/2012	8.05	16.2	101.2	153.6	ND	13.5	ND	ND	ND	1	0.0001	0.0001



Event No.	Location	Date	Field pH (pH Units)	Field Temp (°C)	Field DO (%)	Field EC (µs/cm)	Field TDS (ppm)	Field ORP (mv)	Lab pH (pH Units)	TDS (mg/L)	EC (µs/cm)	Sulphate (mg/L)	Dissolved Hg (mg/L)	Recoverable Hg (mg/L)
4	TAS1	4/10/2012	7.88	21.2	48.9	1173	ND	ND	8.14	710	1150	63	0.0001	0.0001
	TAS2	4/10/2012	7.39	20.5	9.7	1875	ND	ND	7.8	1670	1840	17	0.0001	0.0001
	TAS3	4/10/2012	9.28	24.1	81	263	ND	ND	9.48	174	275	1	0.0001	0.0001
	TAS10	4/10/2012	8.73	23.4	70	1880	ND	ND	8.92	1210	1780	22	0.0001	0.0001
	TAS11	4/10/2012	9.08	28.1	125	1797	ND	ND	9.31	1040	1760	18	0.0001	0.0001
5	AQ1	1/11/2012	8.39	ND	ND	1260	710	ND	ND	ND	ND	65	0.0001	0.0001
	AQ2	1/11/2012	8.23	ND	ND	1670	1160	ND	ND	ND	ND	1	0.0001	0.0001
	AQ3	1/11/2012	9.22	ND	ND	276	177	ND	ND	ND	ND	1	0.0001	0.0001
	AQ4	2/11/2012	8.29	ND	ND	828	543	ND	ND	ND	ND	6	0.0001	0.0001
	AQ5	2/11/2012	8.23	ND	ND	1060	625	ND	ND	ND	ND	23	0.0001	0.0001
	AQ6	2/11/2012	8.34	ND	ND	2980	1840	ND	ND	ND	ND	110	0.0001	0.0001
	AQ8	2/11/2012	7.23	ND	ND	1110	908	ND	ND	ND	ND	1	0.0001	0.0001
	AQ10	1/11/2012	9.29	ND	ND	3090	1980	ND	ND	ND	ND	29	0.0001	0.0001
	AQ11	2/11/2012	8.96	ND	ND	1880	1040	ND	ND	ND	ND	16	0.0001	0.0001
	AQ12	1/11/2012	8.18	ND	ND	705	440	ND	ND	ND	ND	1	0.0001	0.0001
6	AQ1	3/12/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ2	3/12/2012	7.96	30	115.3	1729	ND	34	7.92	1180	1690	6	0.0001	0.0001
	AQ3	4/12/2012	9.13	31.8	67.9	318	ND	8.6	9.15	184	303	1	0.0001	0.0001



Event No.	Location	Date	Field pH (pH Units)	Field Temp (°C)	Field DO (%)	Field EC (µs/cm)	Field TDS (ppm)	Field ORP (mv)	Lab pH (pH Units)	TDS (mg/L)	EC (µs/cm)	Sulphate (mg/L)	Dissolved Hg (mg/L)	Recoverable Hg (mg/L)
	AQ 4	4/12/2012	8.37	34.1	103.9	1007	ND	16.3	8.13	669	1010	4	0.0001	0.0001
	AQ5	4/12/2012	8.61	34.1	145.3	1055	ND	19.5	8.2	617	1070	12	0.0001	0.0001
	AQ6	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ11	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ12	3/12/2012	9.16	32.1	221.6	2085	ND	19.8	9.2	1370	1960	53	0.0001	0.0001
	AQ1	4/12/2012	8.8	28.8	51.2	2033	ND	12.3	9	1160	1980	21	0.0001	0.0001
	AQ 2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
7	AQ3	2/01/2013	ND	ND	ND	ND	ND	ND	8.69	189	329	5	0.0001	0.0001
	AQ4	2/01/2013	ND	ND	ND	ND	ND	ND	8.11	603	995	7	0.0001	0.0001
	AQ12	2/01/2013	ND	ND	ND	ND	ND	ND	8.31	555	991	5	0.0001	0.0001
	AQ6	2/01/2013	ND	ND	ND	ND	ND	ND	8.23	4480	6940	201	0.0001	0.0001
	AQ10	2/01/2013	ND	ND	ND	ND	ND	ND	8.21	581	664	23	0.0001	0.0001
	AQ11	3/01/2013	ND	ND	ND	ND	ND	ND	8.95	1220	2120	24	0.0001	0.0001
	AQ 2	2/01/2013	ND	ND	ND	ND	ND	ND	8	620	814	4	0.0001	0.0001

Event No.	Location	Date	Dissolve d Calcium	Total Calcium	DISSOLVED METALS									
					Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt
		Units	1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L
1	TAS 1	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 3	27/09/2011	ND	ND	ND	0.001	ND	0.011	0.001	0.001	ND	0.05	0.2	ND
	TAS 4	27/09/2011	ND	ND	ND	0.001	ND	0.12	0.001	0.001	ND	0.05	0.2	ND
	TAS 5	27/09/2011	ND	ND	ND	0.001	ND	0.055	0.001	0.001	ND	0.05	0.2	ND
	TAS 6	28/09/2011	ND	ND	ND	0.001	ND	0.084	0.001	0.001	ND	0.05	0.2	ND
	TAS 7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS 10	29/09/2011	ND	ND	ND	0.001	ND	0.162	0.001	0.001	ND	0.06	0.2	ND
	TAS 11	29/09/2011	ND	ND	ND	0.001	ND	0.07	0.001	0.001	ND	0.05	0.2	ND
	TAS 12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2	AQ1	3/03/2012	24	24	0.03	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND
	AQ2	3/03/2012	16	17	0.1	0.001	0.002	ND	0.001	ND	ND	0.0001	0.001	ND
	AQ3	1/03/2012	18	21	0.04	0.001	0.001	ND	0.001	ND	ND	0.0001	0.008	ND
	AQ4	4/03/2012	19	19	0.05	0.001	0.002	ND	0.001	ND	ND	0.0001	0.001	ND
	AQ5	1/03/2012	20	21	0.07	0.001	0.001	ND	0.001	ND	ND	0.0001	0.002	ND
	AQ6	1/03/2012	20	21	0.06	0.001	0.002	ND	0.001	ND	ND	0.0001	0.002	ND
	AQ7	2/03/2012	42	42	0.01	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND



Event No.	Location	Date	Dissolved Calcium	Total Calcium	DISSOLVED METALS									
					Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt
	AQ8	29/02/2012	12	12	0.01	0.001	0.002	ND	0.001	ND	ND	0.0002	0.001	ND
	AQ10	2/03/2012	30	33	0.01	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND
	AQ11	3/03/2012	36	36	0.01	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND
	AQ13	29/02/2012	10	19	0.01	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3	TAS1	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS2	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS3	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS8	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS10	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS14	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L
4	TAS1	4/10/2012	ND	ND	0.01	0.001	0.001	0.099	0.001	0.001	0.05	0.05	0.2	0.001



Event No.	Location	Date	Dissolved Calcium	Total Calcium	DISSOLVED METALS									
					Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt
	TAS2	4/10/2012	ND	ND	0.01	0.001	0.001	0.167	0.001	0.001	0.05	0.05	0.7	0.001
	TAS3	4/10/2012	ND	ND	0.01	0.001	0.001	0.011	0.001	0.001	0.07	0.05	0.5	0.001
	TAS10	4/10/2012	ND	ND	0.01	0.001	0.001	0.089	0.001	0.001	0.29	0.05	0.6	0.002
	TAS11	4/10/2012	ND	ND	0.02	0.002	0.001	0.046	0.001	0.001	0.33	0.05	0.9	0.001
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L
5	AQ1	1/11/2012	ND	ND	0.01	0.001	0.004	0.061	0.001	0.001	0.05	0.05	0.2	0.001
	AQ2	1/11/2012	ND	ND	0.01	0.001	0.004	0.138	0.001	0.001	0.05	0.05	0.2	0.002
	AQ3	1/11/2012	ND	ND	0.01	0.001	0.001	0.012	0.001	0.001	0.06	0.05	0.2	0.001
	AQ4	2/11/2012	ND	ND	0.08	0.001	0.002	0.093	0.001	0.001	0.05	0.05	0.2	0.001
	AQ5	2/11/2012	ND	ND	0.01	0.001	0.004	0.125	0.001	0.001	0.05	0.05	0.2	0.002
	AQ6	2/11/2012	ND	ND	0.01	0.001	0.006	0.215	0.001	0.001	0.05	0.05	0.2	0.002
	AQ8	2/11/2012	ND	ND	0.03	0.001	0.003	0.116	0.001	0.001	0.05	0.05	0.2	0.002
	AQ10	1/11/2012	ND	ND	0.01	0.001	0.004	0.084	0.001	0.001	0.38	0.05	0.2	0.007
	AQ11	2/11/2012	ND	ND	0.01	0.001	0.003	0.076	0.001	0.001	0.32	0.05	0.2	0.001
	AQ12	1/11/2012	ND	ND	0.04	0.001	0.001	0.028	0.001	0.001	0.05	0.05	0.2	0.001
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L
6	AQ1	3/12/2012	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
	AQ2	3/12/2012	ND	ND	0.01	0.001	0.004	0.155	0.001	0.001	0.06	0.05	0.2	0.001
	AQ3	4/12/2012	ND	ND	0.04	0.001	0.001	0.013	0.001	0.001	0.07	0.05	1.4	0.001
	AQ4	4/12/2012	ND	ND	0.01	0.001	0.002	0.073	0.001	0.001	0.06	0.05	0.2	0.001
	AQ5	4/12/2012	ND	ND	0.02	0.001	0.008	0.17	0.001	0.001	0.07	0.05	0.2	0.002



Event No.	Location	Date	Dissolved Calcium	Total Calcium	DISSOLVED METALS									
					Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt
	AQ6		dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
	AQ7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	3/12/2012	ND	ND	0.03	0.001	0.006	0.086	0.001	0.001	0.33	0.05	0.2	0.01
	AQ11	4/12/2012	ND	ND	0.01	0.001	0.002	0.098	0.001	0.001	0.35	0.05	1	0.001
	AQ12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			1000 mg/L	mg/L	mg/L	mg /L	mg /L	mg /L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L
7	AQ3	2/01/2013	ND	ND	0.02	0.001	0.001	0.012	0.001	0.001	0.08	0.05	0.2	0.001
	AQ4	2/01/2013	ND	ND	0.01	0.001	0.001	0.117	0.001	0.001	0.05	0.05	0.2	0.001
	AQ12	2/01/2013	ND	ND	0.01	0.001	0.001	0.014	0.001	0.001	0.07	0.05	0.2	0.001
	AQ6	2/01/2013	ND	ND	0.01	0.001	0.01	0.408	0.001	0.001	0.05	0.05	0.2	0.002
	AQ10	2/01/2013	ND	ND	0.05	0.001	0.002	0.041	0.001	0.001	0.15	0.05	0.9	0.003
	AQ11	3/01/2013	ND	ND	0.01	0.001	0.002	0.114	0.001	0.001	0.36	0.05	0.2	0.001
	AQ2	2/01/2013	ND	ND	0.01	0.001	0.005	0.102	0.001	0.001	0.05	0.05	0.2	0.001

Event No.	Location	Date	DISSOLVED METALS											
			Copper	Gold	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
		Units	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
1	TAS1	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS3	27/09/2011	1.2	0.001	0.05	ND	ND	ND	ND	0.2	ND	0.01	ND	ND
	TAS4	27/09/2011	1.6	0.001	0.05	ND	ND	ND	ND	0.2	ND	0.01	ND	ND
	TAS5	27/09/2011	2.5	0.001	0.05	ND	ND	ND	ND	0.2	ND	0.01	ND	ND
	TAS6	28/09/2011	2.8	0.001	0.05	ND	ND	ND	ND	0.2	ND	0.01	ND	ND
	TAS7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS10	29/09/2011	3.4	0.001	0.05	ND	ND	ND	ND	0.4	ND	0.01	ND	ND
	TAS11	29/09/2011	2.3	0.001	0.05	ND	ND	ND	ND	0.3	ND	0.01	ND	ND
	TAS12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2	AQ1	3/03/2012	0.001	ND	ND	0.001	0.009	0.001	0.001	0.01	ND	ND	0.001	0.005
	AQ2	3/03/2012	0.001	ND	ND	0.001	0.014	0.001	0.001	0.01	ND	ND	0.001	0.007
	AQ3	1/03/2012	0.003	ND	ND	0.001	0.004	0.001	0.003	0.01	ND	ND	0.001	0.005
	AQ4	4/03/2012	0.001	ND	ND	0.001	0.218	0.001	0.002	0.01	ND	ND	0.001	0.005
	AQ5	1/03/2012	0.001	ND	ND	0.001	0.007	0.001	0.001	0.01	ND	ND	0.001	0.005
	AQ6	1/03/2012	0.001	ND	ND	0.001	0.006	0.001	0.001	0.01	ND	ND	0.001	0.005



Event No.	Location	Date	DISSOLVED METALS											
			Copper	Gold	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
	AQ7	2/03/2012	0.002	ND	ND	0.001	0.002	0.001	0.001	0.01	ND	ND	0.001	0.005
	AQ8	29/02/2012	0.001	ND	ND	0.001	0.016	0.001	0.004	0.01	ND	ND	0.001	0.005
	AQ10	2/03/2012	0.002	ND	ND	0.001	0.007	0.001	0.002	0.01	ND	ND	0.001	0.005
	AQ11	3/03/2012	0.003	ND	ND	0.001	0.025	0.001	0.003	0.01	ND	ND	0.002	0.006
	AQ13	29/02/2012	0.001	ND	ND	0.001	0.042	0.001	0.006	0.01	ND	ND	0.001	0.005
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
3	TAS1	4/06/2012	ND	ND	ND	ND	0.012	0.001	0.001	ND	ND	ND	0.003	0.008
	TAS2	4/06/2012	ND	ND	ND	ND	0.056	0.001	0.002	ND	ND	ND	0.001	0.005
	TAS3	4/06/2012	ND	ND	ND	ND	0.021	0.001	0.002	ND	ND	ND	0.001	0.005
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	ND	ND	ND	ND	0.004	0.001	0.002	ND	ND	ND	0.001	0.005
	TAS8	4/06/2012	ND	ND	ND	ND	0.006	0.001	0.002	ND	ND	ND	0.001	0.005
	TAS9	4/06/2012	ND	ND	ND	ND	0.018	0.001	0.001	ND	ND	ND	0.001	0.005
	TAS10	4/06/2012	ND	ND	ND	ND	0.007	0.001	0.002	ND	ND	ND	0.003	0.005
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	ND	ND	ND	ND	0.006	0.001	0.012	ND	ND	ND	0.001	0.005
			µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L



Event No.	Location	Date	DISSOLVED METALS											
			Copper	Gold	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
4	TAS1	4/10/2012	0.9	0.001	0.05	0.001	0.018	0.001	0.001	0.2	ND	0.01	0.004	0.018
	TAS2	4/10/2012	0.5	0.001	0.06	0.001	0.573	0.001	0.002	0.2	ND	0.01	0.001	0.01
	TAS3	4/10/2012	0.7	0.001	0.05	0.001	0.005	0.001	0.002	0.2	ND	0.01	0.001	0.005
	TAS10	4/10/2012	2.8	0.001	0.05	0.001	0.005	0.001	0.005	0.2	ND	0.01	0.002	0.005
	TAS11	4/10/2012	2.6	0.001	0.05	0.001	0.004	0.001	0.004	0.2	ND	0.01	0.004	0.013
			µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
5	AQ1	1/11/2012	1.3	0.001	0.05	0.001	0.098	0.001	0.001	0.2	0.1	0.01	0.002	0.005
	AQ2	1/11/2012	0.5	0.001	0.06	0.001	0.143	0.001	0.001	0.2	0.1	0.01	0.001	0.005
	AQ3	1/11/2012	0.9	0.001	0.05	0.001	0.004	0.001	0.003	0.2	0.1	0.01	0.001	0.005
	AQ4	2/11/2012	1.4	0.001	0.14	0.001	0.161	0.001	0.004	0.2	0.1	0.01	0.001	0.005
	AQ5	2/11/2012	0.5	0.001	0.17	0.001	2.45	0.001	0.002	0.2	0.1	0.01	0.001	0.005
	AQ6	2/11/2012	0.6	0.001	0.13	0.001	1.08	0.002	0.002	0.2	0.1	0.01	0.005	0.005
	AQ8	2/11/2012	1.1	0.001	0.21	0.001	0.022	0.002	0.004	0.3	0.1	0.01	0.001	0.005
	AQ10	1/11/2012	7.1	0.001	0.06	0.001	0.009	0.007	0.017	0.7	0.1	0.01	0.005	0.005
	AQ11	2/11/2012	1.4	0.001	0.05	0.001	0.017	0.001	0.004	0.2	0.1	0.01	0.004	0.005
	AQ12	1/11/2012	0.5	0.001	0.32	0.001	0.136	0.001	0.003	0.2	0.1	0.01	0.001	0.005
			µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
6	AQ1	3/12/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ2	3/12/2012	0.5	0.001	0.09	0.001	0.919	0.001	0.002	0.2	0.1	0.01	0.001	0.005
	AQ3	4/12/2012	1.7	0.001	0.07	0.001	0.01	0.001	0.003	0.2	0.1	0.01	0.001	0.005



Event No.	Location	Date	DISSOLVED METALS											
			Copper	Gold	Iron	Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
	AQ4	4/12/2012	0.9	0.001	0.06	0.001	0.426	0.001	0.003	0.2	0.1	0.01	0.001	0.005
	AQ5	4/12/2012	2.1	0.001	0.05	0.001	1.31	0.006	0.005	0.4	0.1	0.01	0.005	0.005
	AQ6	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	3/12/2012	6.2	0.001	0.2	0.001	0.032	0.008	0.03	0.3	0.1	0.07	0.004	0.005
	AQ11	4/12/2012	7.1	0.001	0.05	0.001	0.004	0.001	0.005	0.9	0.1	0.01	0.005	0.005
	AQ12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			µg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
7	AQ3	2/01/2013	0.8	0.001	0.05	0.001	0.008	0.003	0.002	0.2	ND	0.01	0.001	0.005
	AQ4	2/01/2013	1.5	0.001	0.05	0.001	0.203	0.002	0.004	0.2	ND	0.01	0.001	0.005
	AQ12	2/01/2013	1.3	0.001	0.06	0.001	0.013	0.001	0.003	0.2	ND	0.01	0.001	0.005
	AQ6	2/01/2013	0.6	0.001	0.24	0.001	2.07	0.001	0.004	0.3	ND	0.01	0.004	0.005
	AQ10	2/01/2013	6.9	0.001	0.3	0.001	0.047	0.003	0.01	0.5	ND	0.06	0.001	0.005
	AQ11	3/01/2013	1.6	0.001	0.05	0.001	0.002	0.002	0.005	0.3	ND	0.01	0.007	0.005
	AQ2	2/01/2013	0.5	0.001	0.28	0.001	0.953	0.001	0.004	0.2	ND	0.01	0.001	0.005



Event No.	Location	Date	TOTAL METALS												
			Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt	Copper	Gold	Iron
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
1	TAS1	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS3	27/09/2011	ND	0.001	ND	0.014	0.001	0.001	ND	0.05	0.5	ND	2.4	0.001	0.58
	TAS4	27/09/2011	ND	0.001	ND	0.127	0.001	0.001	ND	0.05	0.7	ND	2.1	0.001	1.07
	TAS5	27/09/2011	ND	0.001	ND	0.088	0.001	0.001	ND	0.05	0.2	ND	2.6	0.001	0.38
	TAS6	28/09/2011	ND	0.001	ND	0.116	0.001	0.001	ND	0.05	0.4	ND	3.8	0.001	1.92
	TAS7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS10	29/09/2011	ND	0.001	ND	0.144	0.001	0.001	ND	0.08	1.4	ND	7.2	0.001	1.05
	TAS11	29/09/2011	ND	0.001	ND	0.072	0.001	0.001	ND	0.05	2.3	ND	3.1	0.001	1.34
	TAS12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2	AQ1	3/03/2012	0.72	0.001	0.002	ND	0.001	ND	ND	0.0001	0.001	ND	0.002	ND	ND
	AQ2	3/03/2012	0.34	0.001	0.003	ND	0.001	ND	ND	0.0001	0.001	ND	0.002	ND	ND
	AQ3	1/03/2012	3.67	0.001	0.002	ND	0.001	ND	ND	0.0001	0.008	ND	0.008	ND	ND
	AQ4	4/03/2012	0.27	0.001	0.002	ND	0.001	ND	ND	0.0001	0.001	ND	0.001	ND	ND
	AQ5	1/03/2012	1.7	0.001	0.002	ND	0.001	ND	ND	0.0001	0.002	ND	0.002	ND	ND
	AQ6	1/03/2012	1.74	0.001	0.002	ND	0.001	ND	ND	0.0001	0.002	ND	0.002	ND	ND



Event No.	Location	Date	TOTAL METALS												
			Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt	Copper	Gold	Iron
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
	AQ7	2/03/2012	0.18	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND	0.002	ND	ND
	AQ8	29/02/2012	0.03	0.001	0.002	ND	0.001	ND	ND	0.0002	0.001	ND	0.001	ND	ND
	AQ10	2/03/2012	0.07	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND	0.003	ND	ND
	AQ11	3/03/2012	0.12	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND	0.004	ND	ND
	AQ13	29/02/2012	0.37	0.001	0.001	ND	0.001	ND	ND	0.0001	0.001	ND	0.002	ND	ND
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
3	TAS1	4/06/2012	0.58	0.001	0.002	0.078	0.001	0.001	0.05	0.05	0.3	0.001	0.8	0.001	0.62
	TAS2	4/06/2012	1.21	0.001	0.001	0.092	0.001	0.001	0.05	0.05	0.6	0.002	1	0.001	1.38
	TAS3	4/06/2012	0.13	0.001	0.002	0.017	0.001	0.001	0.1	0.05	0.4	0.001	1	0.001	0.1
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	2	0.001	0.001	0.177	0.001	0.001	0.09	0.05	2	0.003	3.3	0.001	2.07
	TAS8	4/06/2012	2.75	0.001	0.001	0.054	0.001	0.001	0.05	0.05	5.1	0.002	5.3	0.001	2.77
	TAS9	4/06/2012	1.19	0.001	0.001	0.275	0.001	0.001	0.08	0.05	1.2	0.003	3.2	0.001	1.34
	TAS10	4/06/2012	0.34	0.001	0.001	0.12	0.001	0.001	0.16	0.05	0.9	0.001	2.1	0.001	0.25
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	0.45	0.001	0.001	0.086	0.001	0.001	0.08	0.05	1.7	0.001	4.2	0.001	0.37
4	TAS1	4/10/2012	0.48	0.001	0.002	0.105	0.001	0.001	0.05	0.05	0.7	0.001	1.2	0.001	0.61



Event No.	Location	Date	TOTAL METALS												
			Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt	Copper	Gold	Iron
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
	TAS2	4/10/2012	0.13	0.001	0.002	0.178	0.001	0.001	0.05	0.05	0.8	0.001	0.5	0.001	0.21
	TAS3	4/10/2012	0.18	0.001	0.001	0.014	0.001	0.001	0.06	0.05	0.6	0.001	0.9	0.001	0.26
	TAS10	4/10/2012	0.45	0.001	0.002	0.099	0.001	0.001	0.28	0.05	1.1	0.002	3.2	0.001	0.38
	TAS11	4/10/2012	0.78	0.001	0.001	0.048	0.001	0.001	0.32	0.05	1.9	0.002	2.3	0.001	0.76
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
5	AQ1	1/11/2012	0.5	0.001	0.004	0.096	0.001	0.001	0.05	0.05	0.6	0.001	1.9	0.001	0.77
	AQ2	1/11/2012	0.27	0.001	0.004	0.131	0.001	0.001	0.05	0.05	6.2	0.001	0.5	0.001	0.6
	AQ3	1/11/2012	0.44	0.001	0.002	0.012	0.001	0.001	0.05	0.05	2.1	0.001	1.5	0.001	0.55
	AQ4	2/11/2012	0.54	0.001	0.002	0.093	0.001	0.001	0.05	0.05	0.8	0.002	1.7	0.001	0.72
	AQ5	2/11/2012	0.1	0.001	0.004	0.119	0.001	0.001	0.05	0.05	0.2	0.001	0.5	0.001	0.72
	AQ6	2/11/2012	0.06	0.001	0.006	0.207	0.001	0.001	0.05	0.05	0.2	0.002	0.8	0.001	0.05
	AQ8	2/11/2012	2.88	0.001	0.005	0.145	0.001	0.001	0.05	0.05	8.3	0.006	6.3	0.001	5.48
	AQ10	1/11/2012	0.44	0.001	0.004	0.086	0.001	0.001	0.32	0.05	1.5	0.009	8.7	0.001	0.47
	AQ11	2/11/2012	4.31	0.001	0.003	0.098	0.001	0.001	0.27	0.05	7.5	0.004	3.8	0.001	4.58
	AQ12	1/11/2012	4.94	0.001	0.001	0.05	0.001	0.001	0.06	0.05	4.2	0.004	1.8	0.001	6.48
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6	AQ1	3/12/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ2	3/12/2012	0.04	0.001	0.006	0.204	0.001	0.001	0.07	0.05	0.2	0.002	0.6	0.001	3.99
	AQ3	4/12/2012	1.01	0.001	0.001	0.019	0.001	0.001	0.08	0.05	3.3	0.002	2.1	0.001	1.22
	AQ4	4/12/2012	0.21	0.001	0.004	0.084	0.001	0.001	0.06	0.07	0.5	0.001	1.8	0.001	0.92



Event No.	Location	Date	TOTAL METALS												
			Aluminium	Antimony	Arsenic	Barium	Beryllium	Bismuth	Boron	Cadmium	Chromium	Cobalt	Copper	Gold	Iron
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
	AQ5	4/12/2012	2.58	0.001	0.014	0.258	0.001	0.001	0.07	0.05	2.8	0.006	4.8	0.001	4.31
	AQ6	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	3/12/2012	1.3	0.001	0.006	0.12	0.001	0.001	0.35	0.05	1.9	0.015	2.5	0.001	1.56
	AQ11	4/12/2012	1.69	0.001	0.002	0.113	0.001	0.001	0.37	0.05	1.5	0.002	7.6	0.001	1.72
	AQ12	-	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry	dry
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	µg/L	mg/L	mg/L
7	AQ3	2/01/2013	0.23	0.001	0.001	0.024	0.001	0.001	0.09	0.05	0.2	0.001	0.8	0.001	0.21
	AQ4	2/01/2013	1.34	0.001	0.002	0.141	0.001	0.001	0.05	0.05	2.4	0.003	3.4	0.001	1.72
	AQ12	2/01/2013	5.15	0.001	0.001	0.138	0.001	0.001	0.13	0.05	8.1	0.008	5.4	0.001	5.08
	AQ6	2/01/2013	0.03	0.001	0.01	0.427	0.001	0.001	0.05	0.05	0.2	0.001	0.7	0.001	0.05
	AQ10	2/01/2013	9.12	0.001	0.002	0.079	0.001	0.001	0.16	0.05	13.9	0.01	12.2	0.001	8.09
	AQ11	3/01/2013	1.65	0.001	0.002	0.111	0.001	0.001	0.4	0.05	4.2	0.002	4.7	0.001	1.19
	AQ2	2/01/2013	0.09	0.001	0.006	0.101	0.001	0.001	0.05	0.05	0.2	0.001	0.6	0.001	0.88

Event No.	Location	Date	TOTAL METALS								
			Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
		Units	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
1	TAS1	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS2	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS3	27/09/2011	ND	ND	ND	ND	0.2	0.001	0.01	ND	ND
	TAS4	27/09/2011	ND	ND	ND	ND	0.2	0.001	0.02	ND	ND
	TAS5	27/09/2011	ND	ND	ND	ND	0.2	0.001	0.01	ND	ND
	TAS6	28/09/2011	ND	ND	ND	ND	0.2	0.001	0.03	ND	ND
	TAS7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS10	29/09/2011	ND	ND	ND	ND	0.4	0.001	0.02	ND	ND
	TAS11	29/09/2011	ND	ND	ND	ND	0.3	0.001	0.01	ND	ND
	TAS12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
2	AQ1	3/03/2012	0.001	0.049	0.001	0.001	0.01	ND	ND	0.001	0.005
	AQ2	3/03/2012	0.001	0.105	0.001	0.002	0.01	ND	ND	0.001	0.005
	AQ3	1/03/2012	0.001	0.104	0.001	0.009	0.01	ND	ND	0.001	0.008
	AQ4	4/03/2012	0.001	0.256	0.001	0.003	0.01	ND	ND	0.001	0.005
	AQ5	1/03/2012	0.001	0.066	0.001	0.002	0.01	ND	ND	0.001	0.011



Event No.	Location	Date	TOTAL METALS								
			Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
	AQ6	1/03/2012	0.001	0.051	0.001	0.002	0.01	ND	ND	0.001	0.009
	AQ7	2/03/2012	0.001	0.006	0.001	0.001	0.01	ND	ND	0.001	0.005
	AQ8	29/02/2012	0.001	0.02	0.001	0.005	0.01	ND	ND	0.001	0.005
	AQ10	2/03/2012	0.001	0.025	0.001	0.002	0.01	ND	ND	0.001	0.039
	AQ11	3/03/2012	0.001	0.039	0.002	0.004	0.01	ND	ND	0.003	0.019
	AQ13	29/02/2012	0.001	0.116	0.001	0.007	0.01	ND	ND	0.001	0.01
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
3	TAS1	4/06/2012	0.001	0.044	0.001	0.001	0.2	0.1	0.02	0.003	0.005
	TAS2	4/06/2012	0.003	0.726	0.001	0.004	0.2	0.1	0.03	0.001	0.014
	TAS3	4/06/2012	0.001	0.02	0.001	0.002	0.2	0.1	0.01	0.001	0.005
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	0.002	0.064	0.001	0.004	0.4	0.1	0.03	0.001	0.009
	TAS8	4/06/2012	0.001	0.065	0.001	0.005	0.5	0.1	0.04	0.001	0.007
	TAS9	4/06/2012	0.001	0.085	0.001	0.002	0.3	0.1	0.02	0.001	0.005
	TAS10	4/06/2012	0.001	0.021	0.001	0.003	0.2	0.1	0.01	0.003	0.005
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	0.001	0.007	0.001	0.009	0.4	0.1	0.01	0.001	0.005
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L



Event No.	Location	Date	TOTAL METALS								
			Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
4	TAS1	4/10/2012	0.001	0.1	0.001	0.002	0.2	0.1	0.02	0.005	0.005
	TAS2	4/10/2012	0.001	0.644	0.001	0.002	0.2	0.1	0.01	0.001	0.009
	TAS3	4/10/2012	0.001	0.03	0.001	0.003	0.2	0.1	0.01	0.001	0.005
	TAS10	4/10/2012	0.001	0.04	0.001	0.006	0.2	0.1	0.01	0.002	0.005
	TAS11	4/10/2012	0.001	0.024	0.001	0.005	0.2	0.1	0.01	0.004	0.005
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
5	AQ 1	1/11/2012	0.001	0.285	0.002	0.002	0.2	0.1	0.02	0.004	0.005
	AQ 2	1/11/2012	0.001	1.38	0.001	0.002	0.2	0.1	0.01	0.001	0.005
	AQ 3	1/11/2012	0.001	0.021	0.001	0.004	0.2	0.1	0.01	0.001	0.005
	AQ 4	2/11/2012	0.001	0.366	0.001	0.004	0.2	0.1	0.02	0.001	0.005
	AQ 5	2/11/2012	0.001	2.19	0.001	0.001	0.2	0.1	0.01	0.001	0.005
	AQ 6	2/11/2012	0.001	1.18	0.002	0.001	0.2	0.1	0.01	0.007	0.005
	AQ 8	2/11/2012	0.001	0.684	0.002	0.011	0.5	0.1	0.05	0.001	0.009
	AQ 10	1/11/2012	0.001	0.061	0.01	0.018	0.8	0.1	0.01	0.007	0.005
	AQ 11	2/11/2012	0.001	0.106	0.001	0.013	0.3	0.1	0.05	0.005	0.007
	AQ 12	1/11/2012	0.001	0.336	0.001	0.013	0.2	0.1	0.07	0.001	0.01
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
6	AQ1	3/12/2012	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ2	3/12/2012	0.001	1.15	0.001	0.006	0.2	0.1	0.01	0.001	0.006
	AQ3	4/12/2012	0.001	0.062	0.001	0.006	0.2	0.1	0.02	0.001	0.006
	AQ4	4/12/2012	0.001	0.624	0.002	0.004	0.2	0.1	0.01	0.001	0.006



Event No.	Location	Date	TOTAL METALS								
			Lead	Manganese	Molybdenum	Nickel	Selenium	Silver	Titanium	Uranium	Zinc
	AQ5	4/12/2012	0.004	3.86	0.006	0.009	0.6	0.1	0.06	0.006	0.012
	AQ6	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ7	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ8	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ9	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	3/12/2012	0.001	0.172	0.008	0.042	0.3	0.1	0.04	0.004	0.009
	AQ11	4/12/2012	0.001	0.059	0.001	0.009	0.9	0.1	0.02	0.006	0.006
	AQ12	-	ND	ND	ND	ND	ND	ND	ND	ND	ND
			mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
7	AQ3	2/01/2013	0.001	0.061	0.001	0.003	0.2	0.1	0.01	0.001	0.005
	AQ4	2/01/2013	0.001	0.438	0.002	0.008	0.2	0.1	0.03	0.001	0.005
	AQ12	2/01/2013	0.001	0.25	0.002	0.024	0.2	0.1	0.06	0.001	0.008
	AQ6	2/01/2013	0.001	2.07	0.001	0.001	0.4	0.1	0.01	0.004	0.006
	AQ10	2/01/2013	0.001	0.186	0.002	0.025	0.6	0.1	0.11	0.001	0.018
	AQ11	3/01/2013	0.001	0.042	0.002	0.007	0.3	0.1	0.01	0.008	0.008
	AQ2	2/01/2013	0.001	0.985	0.001	0.003	0.2	0.1	0.01	0.001	0.005



Event No.	Location	Date	Fluoride by PC Titrator (mg/L)	Ammonia as N by Discrete Analyser (mg/L)	Nitrite as N by Discrete Analyser (Nitrite as N 30) (mg/L)	Nitrate as N by Discrete Analyser (Nitrate as N 400) (mg/L)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser (mg/L)	Total Kjeldahl Nitrogen By Discrete Analyser (mg/L)	Total Nitrogen as N (TKN + NOx) by Discrete Analyser (mg/L)	Total Phosphorus as P by Discrete Analyser (mg/L)
1	TAS1	-	ND	ND	ND	ND	ND	ND	ND	ND
	TAS2	-	ND	ND	ND	ND	ND	ND	ND	ND
	TAS3	27/09/2011	0.1	0.06	0.01	0.08	0.08	0.6	0.7	0.03
	TAS4	27/09/2011	0.1	0.33	0.01	0.01	0.01	0.8	0.8	0.12
	TAS5	27/09/2011	0.2	0.05	0.01	0.02	0.02	0.8	0.8	0.08
	TAS6	28/09/2011	0.2	0.07	0.01	0.15	0.15	0.5	0.6	0.06
	TAS7	-	ND	ND	ND	ND	ND	ND	ND	ND
	TAS8	-	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9	-	ND	ND	ND	ND	ND	ND	ND	ND
	TAS10	29/09/2011	0.6	0.02	0.01	0.02	0.02	2	2	0.1
	TAS11	29/09/2011	0.2	0.11	0.08	0.56	0.64	0.8	1.4	0.01
	TAS12	-	ND	ND	ND	ND	ND	ND	ND	ND
2	AQ1	3/03/2012	0.2	0.06	0.01	0.05	0.05	0.4	0.4	0.13
	AQ2	3/03/2012	0.1	0.07	0.01	0.01	0.01	0.8	0.8	0.37
	AQ3	1/03/2012	0.1	0.08	0.01	0.02	0.02	1.6	1.6	0.08
	AQ4	4/03/2012	0.1	0.09	0.01	0.02	0.02	0.9	0.9	0.13
	AQ5	1/03/2012	0.2	0.09	0.01	0.04	0.04	0.5	0.5	0.11
	AQ6	1/03/2012	0.2	0.05	0.01	0.03	0.03	0.5	0.5	0.12
	AQ7	2/03/2012	0.3	0.07	0.01	0.01	0.01	0.6	0.6	0.11



Event No.	Location	Date	Fluoride by PC Titrator (mg/L)	Ammonia as N by Discrete Analyser (mg/L)	Nitrite as N by Discrete Analyser (Nitrite as N 30) (mg/L)	Nitrate as N by Discrete Analyser (Nitrate as N 400) (mg/L)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser (mg/L)	Total Kjeldahl Nitrogen By Discrete Analyser (mg/L)	Total Nitrogen as N (TKN + NOx) by Discrete Analyser (mg/L)	Total Phosphorus as P by Discrete Analyser (mg/L)
	AQ8	29/02/2012	0.1	0.09	0.01	0.02	0.02	1.3	1.3	0.29
	AQ10	2/03/2012	0.5	0.1	0.01	0.03	0.03	0.6	0.6	0.05
	AQ11	3/03/2012	0.2	0.09	0.01	0.02	0.02	1.1	1.1	0.02
	AQ13	29/02/2012	0.2	0.1	0.01	0.01	0.01	1.2	1.2	0.06
3	TAS1	4/06/2012	0.2	0.09	0.01	0.02	0.02	0.3	0.3	0.09
	TAS2	4/06/2012	0.1	0.06	0.01	0.01	0.01	1.1	1.1	0.18
	TAS3	4/06/2012	0.2	0.05	0.01	0.04	0.04	0.8	0.8	0.02
	TAS4	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND
	TAS5	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND
	TAS6	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	0.3	0.05	0.34	3.4	3.74	0.8	4.5	0.09
	TAS8	4/06/2012	0.2	0.16	0.01	0.02	0.02	1.4	1.4	0.24
	TAS9	4/06/2012	0.2	0.07	0.08	3.84	3.92	1.3	5.2	0.08
	TAS10	4/06/2012	0.4	0.04	0.44	2.33	2.77	1.1	3.9	0.02
	TAS11	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	0.1	0.04	0.01	0.01	0.01	1.1	1.1	1.05
		4/06/2012	0.1	0.1	0.01	0.02	0.02	0.8	0.8	0.05

Event No.	Location	Date	Fluoride by PC Titrator (mg/L)	Ammonia as N by Discrete Analyser (mg/L)	Nitrite as N by Discrete Analyser (Nitrite as N 30) (mg/L)	Nitrate as N by Discrete Analyser (Nitrate as N 400) (mg/L)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser (mg/L)	Total Kjeldahl Nitrogen By Discrete Analyser (mg/L)	Total Nitrogen as N (TKN + NOx) by Discrete Analyser (mg/L)	Total Phosphorus as P by Discrete Analyser (mg/L)
4	TAS1	4/10/2012	0.2	0.04	0.01	0.02	0.02	0.6	0.6	0.21
	TAS2	4/10/2012	0.1	0.05	0.01	0.03	0.03	0.7	0.7	0.16
	TAS3	4/10/2012	0.2	0.06	0.01	0.04	0.04	0.9	0.9	0.04
	TAS10	4/10/2012	0.5	0.04	0.01	0.02	0.02	1.2	1.2	0.08
	TAS11	4/10/2012	0.2	0.06	0.01	0.03	0.03	1.8	1.8	0.22
5	AQ 1	1/11/2012	0.3	0.06	0.01	0.01	0.01	1.4	1.4	0.24
	AQ 2	1/11/2012	0.1	0.06	0.01	0.01	0.01	0.8	0.8	0.07
	AQ 3	1/11/2012	0.2	0.07	0.01	0.02	0.02	1.1	1.1	0.01
	AQ 4	2/11/2012	0.1	0.05	0.01	0.03	0.03	1	1	0.05
	AQ 5	2/11/2012	0.2	0.08	0.01	0.01	0.01	0.7	0.7	0.12
	AQ 6	2/11/2012	0.2	0.05	0.01	0.04	0.04	1.5	1.5	0.26
	AQ 8	2/11/2012	0.3	0.13	0.01	0.02	0.02	10.6	10.6	1.22
	AQ 10	1/11/2012	0.6	0.08	0.01	0.01	0.01	6.8	6.8	0.76
	AQ 11	2/11/2012	0.3	0.12	0.01	0.04	0.04	1.2	1.2	0.06
	AQ 12	1/11/2012	0.3	0.09	0.01	0.03	0.03	1.4	1.4	0.03
6	AQ 1	3/12/2012	ND	ND	ND	ND	ND	ND	ND	ND
	AQ 2	3/12/2012	0.2	0.05	0.01	0.01	0.01	2.6	2.6	0.9
	AQ 3	4/12/2012	0.2	0.04	0.01	0.01	0.01	1.2	1.2	0.04



Event No.	Location	Date	Fluoride by PC Titrator (mg/L)	Ammonia as N by Discrete Analyser (mg/L)	Nitrite as N by Discrete Analyser (Nitrite as N 30) (mg/L)	Nitrate as N by Discrete Analyser (Nitrate as N 400) (mg/L)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser (mg/L)	Total Kjeldahl Nitrogen By Discrete Analyser (mg/L)	Total Nitrogen as N (TKN + NOx) by Discrete Analyser (mg/L)	Total Phosphorus as P by Discrete Analyser (mg/L)
	AQ 4	4/12/2012	0.2	0.09	0.01	0.07	0.07	1.5	1.6	0.12
	AQ 5	4/12/2012	0.4	0.08	0.01	0.07	0.07	4	4.1	0.43
	AQ 6	-	ND	ND	ND	ND	ND	ND	ND	ND
	AQ 7	-	ND	ND	ND	ND	ND	ND	ND	ND
	AQ 8	-	ND	ND	ND	ND	ND	ND	ND	ND
	AQ 9	-	ND	ND	ND	ND	ND	ND	ND	ND
	AQ 10	3/12/2012	0.5	0.08	0.01	0.01	0.01	13.8	13.8	3.28
	AQ 11	4/12/2012	0.3	0.07	0.01	0.02	0.02	1	1	0.17
	AQ 12	-	ND	ND	ND	ND	ND	ND	ND	ND
7	AQ 3	2/01/2013	0.3	0.15	0.01	0.03	0.03	1.2	1.2	0.04
	AQ 4	2/01/2013	0.2	0.09	0.01	0.01	0.02	1.3	1.3	0.01
	AQ 12	2/01/2013	0.4	0.06	0.01	0.02	0.02	1.7	1.7	0.07
	AQ 6	2/01/2013	0.2	0.55	0.01	0.01	0.01	1.3	1.3	0.24
	AQ 10	2/01/2013	0.3	0.13	0.01	0.01	0.01	3	3	0.97
	AQ 11	3/01/2013	0.3	0.06	0.01	0.04	0.04	1.7	1.7	0.19
	AQ 2	2/01/2013	0.1	0.06	0.01	0.02	0.02	1.2	1.2	0.2

Appendix D Sediment Quality Data

Summary of Sediment Data

Note on nomenclature - the letter prefixes of location descriptors may vary depending on the personnel, timing and/or purpose of surveys, however the site number is consistent for each location (ie TAS1=AQ1=AARCTSS1)

ND - no data is available

Event No.	Location	Date	Lab pH (pH Units)	EC (µs/cm)	Moisture Content (%)	Particle Size (%)											
						+75µm	+150µm	+300µm	+425µm	+600µm	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm
1	TAS1	28/09/2011	5.7	288	18.1	17	8	5	4	4	2	1	1	1	1	1	1
	TAS2	28/09/2011	5.6	170	12.7	41	20	7	4	3	2	1	1	1	1	1	1
	TAS3	27/09/2011	6.6	49	38.7	53	52	52	52	52	51	50	46	36	1	1	1
	TAS4	27/09/2011	6	178	10.9	6	4	2	2	2	1	1	1	1	1	1	1
	TAS5	27/09/2011	6.9	23	1	97	96	95	91	77	42	14	2	1	1	1	1
	TAS6	28/09/2011	7	15	26.2	40	14	4	2	2	1	1	1	1	1	1	1
	TAS7	28/09/2011	7.8	14	1	98	98	97	92	77	38	9	1	1	1	1	1
	TAS8	27/09/2011	6.8	60	50.8	1	1	1	1	1	1	1	1	1	1	1	1
	TAS9	28/09/2011	8	54	2	71	65	59	56	51	36	16	6	2	1	1	1
	TAS10	29/09/2011	8.8	347	11.7	89	88	82	76	64	29	7	4	3	1	1	1
	TAS11	29/09/2011	8.8	582	16.8	80	67	44	33	29	26	25	24	24	1	1	1
	TAS12	29/09/2011	8	102	35.6	28	21	12	8	6	3	1	1	1	1	1	1
2	AQ8	29/02/2012	ND	ND	36.6	8	5	3	2	2	1	1	1	1	1	1	1
	AQ13	29/02/2012	ND	ND	15.9	45	33	18	11	6	2	1	1	1	1	1	1
	AQ1	3/03/2012	ND	ND	27.3	8	2	1	1	1	1	1	1	1	1	1	1
	AQ4	4/03/2012	ND	ND	36.2	14	10	7	5	4	3	2	1	1	1	1	1
	AQ11	3/03/2012	ND	ND	11.8	79	70	44	24	14	5	2	1	1	1	1	1
	AQ2	3/03/2012	ND	ND	14.6	24	12	4	2	1	1	1	1	1	1	1	1
	AQ5	1/03/2012	ND	ND	26.6	21	8	3	2	2	1	1	1	1	1	1	1
	AQ10	2/03/2012	ND	ND	12.8	76	73	62	50	38	19	7	1	1	1	1	1
	AQ7	2/03/2012	ND	ND	6.1	95	95	91	82	62	25	7	1	1	1	1	1
	AQ9	2/03/2012	ND	ND	6.8	67	59	42	32	22	8	3	2	1	1	1	1
	AQ6	1/03/2012	ND	ND	25.4	24	11	3	2	1	1	1	1	1	1	1	1
	AQ3	1/03/2012	ND	ND	22.1	8	5	3	2	1	1	1	1	1	1	1	1
3	TAS1	4/06/2012	7.9	61	4	81	77	68	62	58	54	46	33	10	1	1	1
	TAS2	4/06/2012	6.7	67	21.8	18	6	3	2	2	1	1	1	1	1	1	1
	TAS3	4/06/2012	7.7	122	21	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS7	4/06/2012	9	44	1	96	96	93	87	74	39	6	1	1	1	1	1
	TAS8	4/06/2012	6.4	22	33.8	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS9A	4/06/2012	8.8	82	8.8	69	64	53	42	27	8	1	1	1	1	1	1
	TAS9B	4/06/2012	9.2	59	1.7	95	94	90	82	69	49	24	8	6	1	1	1
	TAS10	4/06/2012	9.5	428	18.6	87	85	77	70	63	42	14	3	1	1	1	1
	TAS12	4/06/2012	8.8	149	29.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	TAS13	4/06/2012	8.9	54	21.7	95	95	94	90	74	28	3	1	1	1	1	1
	TAS14	4/06/2012	7.8	284	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4	TAS1	4/10/2012	8.5	147	2.5	80	78	72	66	55	25	10	4	1	1	1	1
	TAS2	4/10/2012	7.5	122	28.3	15	5	3	2	2	1	1	1	1	1	1	1
	TAS3	4/10/2012	8.1	185	19.5	45	37	34	32	31	29	27	20	8	1	1	1
	TAS7	4/10/2012	9.2	82	1	98	98	96	89	66	21	4	1	1	1	1	1
	TAS9	5/10/2012	9.3	51	1	98	98	95	88	74	43	16	3	1	1	1	1
	TAS10	4/10/2012	8.2	583	1.7	91	88	71	46	23	6	1	1	1	1	1	1
	TAS11	4/10/2012	9.2	717	23.9	61	56	37	22	14	7	2	1	1	1	1	1
	TAS12	4/10/2012	8.1	248	42.3	18	10	4	2	2	1	1	1	1	1	1	1
5	AQ1	1/11/2012	7.4	156	29.2	25	16	13	12	11	6	1	1	1	1	1	1
	AQ2	1/11/2012	7.4	152	33.7	19	7	2	1	1	1	1	1	1	1	1	1
	AQ3	1/11/2012	7.5	291	49.1	40	37	35	34	33	31	26	19	13	1	1	1
	AQ4	2/11/2012	7.7	238	35.9	23	18	12	8	5	2	1	1	1	1	1	1
	AQ5	2/11/2012	7.4	57	19.3	98	97	94	86	74	42	15	2	1	1	1	1
	AQ6	2/11/2012	8.5	162	12.5	98	98	98	96	88	58	28	14	11	1	1	1
	AQ7	1/11/2012	9.2	46	1	98	98	95	87	69	25	5	1	1	1	1	1
	AQ8	2/11/2012	7	293	55.6	1	1	1	1	1	1	1	1	1	1	1	1
	AQ9	2/11/2012	8.5	94	10.6	68	61	50	45	41	30	14	4	1	1	1	1
	AQ10	1/11/2012	9.5	439	18.9	92	91	88	82	70	37	11	3	1	1	1	1
	AQ11	2/11/2012	8.4	378	34	51	44	25	15	9	3	1	1	1	1	1	1
	AQ12	1/11/2012	7.3	319	58	23	18	9	6	4	2	1	1	1	1	1	1

Event No.	Location	Date	Lab pH (pH Units)	EC (µs/cm)	Moisture Content (%)	Particle Size (%)											
						+75µm	+150µm	+300µm	+425µm	+600µm	+1180µm	+2.36mm	+4.75mm	+9.5mm	+19.0mm	+37.5mm	+75.0mm
6	AQ1	3/12/2012	7.6	398	32.8	10	5	3	3	2	2	1	1	1	1	1	1
	AQ2	3/12/2012	6.6	73	35.3	16	9	5	4	4	2	1	1	1	1	1	1
	AQ3	4/12/2012	7	88	41.2	78	76	75	75	75	73	71	65	49	15	1	1
	AQ7	3/12/2012	8.9	54	6.4	95	95	94	88	70	27	4	1	1	1	1	1
	AQ9	3/12/2012	8.5	102	7.7	75	68	49	30	17	6	3	2	1	1	1	1
	AQ10	3/12/2012	8.6	294	16.3	98	98	98	96	90	59	22	4	1	1	1	1
	AQ11	4/12/2012	8.6	251	39.6	66	58	39	29	23	16	11	7	6	1	1	1
	AQ12	4/12/2012	7	230	74.2	24	18	10	6	4	2	1	1	1	1	1	1
	AQ4	4/12/2012	6.3	221	44.9	8	3	2	1	1	1	1	1	1	1	1	1
	AQ5	4/12/2012	7.4	272	33.7	84	78	76	75	68	33	12	4	1	1	1	1
7	AQ6	4/12/2012	8	279	27.9	97	97	96	91	69	15	2	1	1	1	1	1
	AQ8	4/12/2012	6.2	173	41.2	1	1	1	1	1	1	1	1	1	1	1	1
	AQ7	3/01/2013	8.9	42	3.1	99	98	97	92	81	48	15	1	1	1	1	1
	AQ11	3/01/2013	8.9	307	23.6	71	62	34	20	13	7	3	1	1	1	1	1
	AQ6	2/01/2013	8.4	252	19.7	100	100	99	98	93	65	21	1	1	1	1	1
	AQ8	2/01/2013	7.1	172	10.6	1	1	1	1	1	1	1	1	1	1	1	1
	AQ1	3/01/2013	7.3	44	25.6	8	3	1	1	1	1	1	1	1	1	1	1
	AQ12	2/01/2013	7.9	322	45.1	23	18	11	7	5	2	1	1	1	1	1	1
	AQ2	2/01/2013	7.5	80	33.6	18	8	6	4	4	2	1	1	1	1	1	1
	AQ3	2/01/2013	7.5	275	27.3	32	26	23	22	21	19	15	12	12	1	1	1
7	AQ5	3/01/2013	7.8	347	31	49	38	30	27	23	13	6	2	1	1	1	1
	AQ4	2/01/2013	7.8	565	38.7	12	9	6	5	4	2	1	1	1	1	1	1
	AQ9	2/01/2013	8.6	77	7.2	67	60	46	31	18	6	3	2	2	1	1	1
	AQ10	2/01/2013	9.3	177	24.5	94	93	90	86	75	41	12	3	2	1	1	1

Event No.	Location	Date	Sediment classification based on Particle Size (%)							Aluminium (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Bismuth (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)
			Clay (2 µm)	Silt (2-60 µm)	Fines (<75 µm)	Sand (0.06-2.00 mm)	Sand (>75 µm)	Gravel (>2mm)	Cobbles (>6cm)								
1	TAS1	28/09/2011			83		16	1	1	10700	2	3.5	94.1	0.8	0.2	50	0.1
	TAS2	28/09/2011			59		40	1	1	10500	0.1	2.8	92.7	0.7	0.2	50	0.1
	TAS3	27/09/2011			47		2	50	1	19400	0.1	0.7	99.1	0.5	0.1	50	0.1
	TAS4	27/09/2011			94		5	1	1	22800	0.1	2.4	160	1	0.2	50	0.1
	TAS5	27/09/2011			3		83	14	1	1430	0.1	2.7	21.2	0.2	0.1	50	0.1
	TAS6	28/09/2011			60		39	1	1	10700	0.1	3	117	0.8	0.2	50	0.1
	TAS7	28/09/2011			2		89	9	1	1030	0.1	0.2	71.8	0.1	0.1	50	0.1
	TAS8	27/09/2011			99		1	1	1	32400	0.1	1	173	1.2	0.1	50	0.1
	TAS9	28/09/2011			29		54	16	1	6380	0.1	0.7	222	0.5	0.1	50	0.1
	TAS10	29/09/2011			11		82	7	1	5040	0.1	0.2	97.7	0.2	0.1	50	0.1
	TAS11	29/09/2011			20		55	25	1	5160	0.1	0.7	32	0.2	0.1	50	0.1
	TAS12	29/09/2011			72		27	1	1	21700	0.1	0.8	110	0.4	0.1	50	0.1
2	AQ8	29/02/2012	74	16		10		1	1	ND	5	5	230	1	ND	ND	1
	AQ13	29/02/2012	40	10		49		1	1	ND	5	5	70	1	ND	ND	1
	AQ1	3/03/2012	34	50		16		1	1	ND	5	5	130	1	ND	ND	1
	AQ4	4/03/2012	69	15		15		1	1	ND	5	5	140	1	ND	ND	1
	AQ11	3/03/2012	18	2		78		2	1	ND	5	5	30	1	ND	ND	1
	AQ2	3/03/2012	36	40		24		1	1	ND	5	5	120	1	ND	ND	1
	AQ5	1/03/2012	30	49		21		1	1	ND	5	5	100	1	ND	ND	1
	AQ10	2/03/2012	18	5		70		7	1	ND	5	5	160	1	ND	ND	1
	AQ7	2/03/2012	4	1		88		7	1	ND	5	5	100	1	ND	ND	1
	AQ9	2/03/2012	24	9		64		3	1	ND	5	5	150	1	ND	ND	1
	AQ6	1/03/2012	31	45		24		1	1	ND	5	5	110	1	ND	ND	1
	AQ3	1/03/2012	73	15		12		1	1	ND	5	5	180	1	ND	ND	1
3	TAS1	4/06/2012	9	9		36		46	1	6140	5	5	60	1	0.1	50	1
	TAS2	4/06/2012	41	28		31		1	1	13700	5	5	140	1	0.2	50	1
	TAS3	4/06/2012	ND	ND	ND	ND	ND	ND	ND	28900	5	5	180	1	0.1	50	1
	TAS7	4/06/2012	3	1		91		6	1	1960	5	5	120	1	0.1	50	1
	TAS8	4/06/2012	ND	ND	ND	ND	ND	ND	ND	17500	5	5	90	1	0.1	50	1
	TAS9A	4/06/2012	20	11		68		1	1	5830	5	5	230	1	0.1	50	1
	TAS9B	4/06/2012	3	2		71		24	1	2600	5	5	70	1	0.1	50	1
	TAS10	4/06/2012	9	4		73		14	1	6020	5	5	190	1	0.1	50	1
	TAS12	4/06/2012	ND	ND	ND	ND	ND	ND	ND	24000	5	5	140	1	0.1	50	1
	TAS13	4/06/2012	3	1		93		3	1	1210	5	5	20	1	0.1	50	1
	TAS14	4/06/2012	ND	ND	ND	ND	ND	ND	ND	4470	5	5	30	1	0.1	50	1
4	TAS1	4/10/2012	13	6		71		10	1	4430	0.1	4.1	71.1	0.4	0.1	50	0.1
	TAS2	4/10/2012	34	45		21		1	1	15200	0.1	3.7	143	0.9	0.2	50	0.1
	TAS3	4/10/2012	16	35		22		27	1	21000	0.1	0.8	183	0.3	0.1	50	0.1
	TAS7	4/10/2012	2	1		94		3	1	1160	0.1	0.3	69.8	0.1	0.1	50	0.1
	TAS9	5/10/2012	2	1		81		16	1	920	0.1	0.5	56.2	0.1	0.1	50	0.1
	TAS10	4/10/2012	8	1		90		1	1	4350	0.1	0.4	118	0.2	0.1	50	0.1
	TAS11	4/10/2012	32	7		59		2	1	11600	0.1	1	80.8	0.2	0.1	50	0.1
	TAS12	4/10/2012	66	17		17		1	1	24900	0.1	1.3	138	0.6	0.1	50	0.1
5	AQ1	1/11/2012	32	34		33		1	1	14300	5	6	130	1	0.3	50	1
	AQ2	1/11/2012	38	38		24		1	1	16000	5	5	130	1	0.2	50	1
	AQ3	1/11/2012	30	29		15		26	1	39300	5	5	170	1	0.1	50	1
	AQ4	2/11/2012	63	14		23		1	1	23000	5	5	120	1	0.1	50	1
	AQ5	2/11/2012	2	1		83		15	1	1650	5	5	30	1	0.1	50	1
	AQ6	2/11/2012	1	1		71		28	1	1410	5	5	30	1	0.1	50	1
	AQ7	1/11/2012	1	1		93		5	1	1480	5	5	120	1	0.1	50	1
	AQ8	2/11/2012	82	16		2		1	1	42100	5	5	250	1	0.2	50	1
	AQ9	2/11/2012	21	10		55		14	1	7340	5	5	250	1	0.1	50	1
	AQ10	1/11/2012	7	1		81		11	1	4570	5	5	120	1	0.1	50	1
	AQ11	2/11/2012	40	8		51		1	1	18600	5	5	120	1	0.1	50	1
	AQ12	1/11/2012	59	17		24		1	1	23800	5	5	110	1	0.1	50	1
6	AQ1	3/12/2012	42	45		12		1	1	23400	0.2	3.4	146	1.3	0.3	50	0.1
	AQ2	3/12/2012	50	30		19		1	1	25400	0.2	3.1	144	1.1	0.2	50	0.1
	AQ3	4/12/2012	6	15		8		71	1	24700	0.1	0.6	117	0.4	0.1	50	0.1

Event No.	Location	Date	Sediment classification based on Particle Size (%)							Aluminium (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Bismuth (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)
			Clay (2 µm)	Silt (2-60 µm)	Fines (<75 µm)	Sand (0.06-2.00 mm)	Sand (>75 µm)	Gravel (>2mm)	Cobbles (>6cm)								
	AQ7	3/12/2012	4	1		91		4	1	2430	0.1	0.3	64	0.1	0.1	50	0.1
	AQ9	3/12/2012	19	5		73		3	1	10700	0.1	0.6	208	0.6	0.1	50	0.1
	AQ10	3/12/2012	1	1		76		22	1	4720	0.1	0.5	73.4	0.2	0.1	50	0.1
	AQ11	4/12/2012	29	6		54		11	1	16600	0.1	0.8	81.6	0.3	0.1	50	0.1
	AQ12	4/12/2012	60	13		26		1	1	39600	0.1	1.3	166	0.6	0.1	50	0.1
	AQ4	4/12/2012	46	44		10		1	1	26300	0.2	3.4	156	1.4	0.3	50	0.1
	AQ5	4/12/2012	10	5		73		12	1	15500	0.1	3	118	0.8	0.2	50	0.1
	AQ6	4/12/2012	3	1		95		2	1	2800	0.1	2.8	19.6	0.3	0.1	50	0.1
	AQ8	4/12/2012	84	15		1		1	1	52200	0.1	1	204	1.6	0.2	50	0.1
7	AQ7	3/01/2013	1	1		84		15	1	2140	0.1	0.2	94.6	0.2	0.1	50	0.1
	AQ11	3/01/2013	23	5		69		3	1	13000	0.1	0.5	79.9	0.2	0.1	50	0.1
	AQ6	2/01/2013	1	1		79		21	1	2780	0.1	8.9	57	0.4	0.1	50	0.1
	AQ8	2/01/2013	78	21		1		1	1	54400	0.1	1.2	234	1.6	0.2	50	0.1
	AQ1	3/01/2013	43	49		8		1	1	27900	0.2	5.3	155	1.4	0.3	50	0.1
	AQ12	2/01/2013	64	12		23		1	1	37700	0.1	0.8	154	0.6	0.1	50	0.1
	AQ2	2/01/2013	45	32		22		1	1	22700	0.1	2.8	130	1.1	0.2	50	0.1
	AQ3	2/01/2013	43	24		18		15	1	24000	0.1	0.5	125	0.3	0.1	50	0.1
	AQ5	3/01/2013	27	22		45		6	1	19700	0.2	4.3	139	1.1	0.3	50	0.1
	AQ4	2/01/2013	72	15		12		1	1	41800	0.1	1.9	157	0.7	0.1	50	0.1
	AQ9	2/01/2013	23	9		65		3	1	10100	0.1	1.1	129	0.6	0.1	50	0.1
	AQ10	2/01/2013	6	1		82		12	1	7260	0.1	0.9	146	0.3	0.1	50	0.1



Event No.	Location	Date	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Gold (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Titanium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
1	TAS1	28/09/2011	17.7	10	13.1	0.1	18300	10.2	335	0.2	13.6	1	0.1	ND	0.1	0.7	ND	34.4
	TAS2	28/09/2011	21.7	9	12.5	0.1	18300	8.2	363	0.2	16.1	1	0.1	ND	0.1	0.6	ND	34.4
	TAS3	27/09/2011	87.6	31.2	26.4	0.1	50600	1.6	450	0.5	102	1	0.1	ND	0.1	0.2	ND	61.3
	TAS4	27/09/2011	60.8	29.7	33.4	0.1	35800	8.9	1090	0.3	56.1	1	0.1	ND	0.1	0.6	ND	53.3
	TAS5	27/09/2011	3.3	2.6	2	0.1	5620	3.2	150	0.1	2.5	1	0.1	ND	0.1	0.2	ND	6.9
	TAS6	28/09/2011	14.9	8.3	12.9	0.1	17600	9.4	320	0.2	12.8	1	0.1	ND	0.1	0.7	ND	39
	TAS7	28/09/2011	7.8	6	2.3	0.1	5780	0.8	366	0.1	5.3	1	0.1	ND	0.1	0.1	ND	2.4
	TAS8	27/09/2011	54.1	23.6	27.4	0.1	43400	5.7	754	0.2	42.6	1	0.1	ND	0.1	0.5	ND	59.3
	TAS9	28/09/2011	41.9	28	10.2	0.1	12900	6.5	1130	0.3	23.3	1	0.1	ND	0.1	0.3	ND	7.6
	TAS10	29/09/2011	17.6	10.7	5.8	0.1	8600	1.3	451	0.1	16.9	1	0.1	ND	0.1	0.2	ND	6.3
	TAS11	29/09/2011	14.7	4.8	4.8	0.1	7460	2.1	72.8	0.1	9.7	1	0.1	ND	0.1	0.2	ND	4.4
	TAS12	29/09/2011	55.4	19.2	22.1	0.1	25300	3.2	428	0.3	48.2	1	0.1	ND	0.1	0.3	ND	25.4
2	AQ8	29/02/2012	93	52	49	ND	ND	6	1910	ND	111	5	2	ND	ND	0.6	102	57
	AQ13	29/02/2012	26	7	7	ND	ND	5	264	ND	17	5	2	ND	ND	0.5	44	11
	AQ1	3/03/2012	22	12	20	ND	ND	12	680	ND	20	5	2	ND	ND	1.2	42	49
	AQ4	4/03/2012	111	41	56	ND	ND	5	1220	ND	118	5	2	ND	ND	0.3	127	52
	AQ11	3/03/2012	11	3	5	ND	ND	5	60	ND	6	5	2	ND	ND	0.1	17	5
	AQ2	3/03/2012	30	13	17	ND	ND	10	596	ND	26	5	2	ND	ND	0.8	42	38
	AQ5	1/03/2012	17	9	14	ND	ND	10	468	ND	15	5	2	ND	ND	0.9	35	39
	AQ10	2/03/2012	21	12	8	ND	ND	5	424	ND	25	5	2	ND	ND	0.3	36	11
	AQ7	2/03/2012	18	14	13	ND	ND	5	564	ND	12	5	2	ND	ND	0.2	135	6
	AQ9	2/03/2012	36	15	13	ND	ND	5	648	ND	19	5	2	ND	ND	0.2	40	10
	AQ6	1/03/2012	20	9	16	ND	ND	11	485	ND	18	5	2	ND	ND	1	38	42
	AQ3	1/03/2012	71	19	46	ND	ND	5	393	ND	45	5	2	ND	ND	0.6	107	29
3	TAS1	4/06/2012	37	7	8	0.1	27900	10	260	2	11	5	2	ND	5	0.6	52	21
	TAS2	4/06/2012	21	11	19	0.1	21700	12	536	2	20	5	2	ND	5	0.9	41	47
	TAS3	4/06/2012	118	40	49	0.1	71400	5	842	2	110	5	2	ND	5	0.3	100	71
	TAS7	4/06/2012	17	16	6	0.1	13100	5	693	2	9	5	2	ND	5	0.1	51	5
	TAS8	4/06/2012	28	11	18	0.1	24400	6	315	2	19	5	2	ND	5	0.4	53	36
	TAS9A	4/06/2012	40	16	10	0.1	12000	6	936	2	16	5	2	ND	5	0.3	45	8
	TAS9B	4/06/2012	17	12	8	0.1	14300	5	464	2	7	5	2	ND	5	0.1	61	6
	TAS10	4/06/2012	16	12	7	0.1	10500	5	574	2	18	5	2	ND	5	0.2	32	8
	TAS12	4/06/2012	63	23	31	0.1	31200	6	685	2	46	5	2	ND	5	0.6	102	29
	TAS13	4/06/2012	6	2	5	0.1	3920	5	56	2	4	5	2	ND	5	0.1	10	5
	TAS14	4/06/2012	13	3	5	0.1	8130	5	106	2	9	5	2	ND	5	0.2	24	8
4	TAS1	4/10/2012	19.6	8.9	6.6	0.1	15000	8.3	453	0.2	9.2	1	0.1	87	ND	0.4	ND	16.6
	TAS2	4/10/2012	25.1	12.9	20.1	0.1	26500	11.5	594	0.3	23	1	0.1	146	ND	1	ND	48.1
	TAS3	4/10/2012	78.5	39.1	32.4	0.1	58500	1.4	634	0.4	126	1	0.1	432	ND	0.2	ND	55
	TAS7	4/10/2012	10.6	9.3	3.1	0.1	5220	1	386	0.1	5.2	1	0.1	45	ND	0.1	ND	2.9
	TAS9	5/10/2012	13.7	10	6.5	0.1	14200	1.2	420	0.1	5.4	1	0.1	48	ND	0.1	ND	4.1
	TAS10	4/10/2012	16.1	14.3	5.2	0.1	7990	1.8	543	0.1	15.9	1	0.1	160	ND	0.2	ND	6.2
	TAS11	4/10/2012	32.5	11.7	12.2	0.1	14900	1.8	236	0.2	29.7	1	0.1	102	ND	0.2	ND	13.3
	TAS12	4/10/2012	70.9	25.4	31.2	0.1	32100	4.8	650	0.5	58.5	1	0.1	114	ND	0.5	ND	29.3
5	AQ1	1/11/2012	21	12	19	0.1	23300	13	375	2	19	5	2	260	ND	1.1	ND	45
	AQ2	1/11/2012	29	12	20	0.1	24300	10	418	2	26	5	2	220	ND	0.8	ND	41
	AQ3	1/11/2012	123	44	44	0.1	57500	5	564	2	139	5	2	480	ND	0.3	ND	74
	AQ4	2/11/2012	73	31	38	0.1	40200	5	806	2	66	5	2	600	ND	0.3	ND	37
	AQ5	2/11/2012	3	4	5	0.1	7580	5	216	2	3	5	2	50	ND	0.2	ND	8
	AQ6	2/11/2012	4	4	5	0.1	8140	5	211	2	3	5	2	40	ND	0.2	ND	8
	AQ7	1/11/2012	12	13	5	0.1	8780	5	638	2	9	5	2	70	ND	0.1	ND	5
	AQ8	2/11/2012	64	29	39	0.1	57000	8	760	2	57	5	2	300	ND	0.7	ND	74
	AQ9	2/11/2012	46	15	12	0.1	13600	5	478	2	20	5	2	60	ND	0.3	ND	9
	AQ10	1/11/2012	14	10	5	0.1	8030	5	548	2	17	5	2	120	ND	0.2	ND	5
	AQ11	2/11/2012	47	15	17	0.1	22300	5	241	2	40	5	2	100	ND	0.4	ND	17
	AQ12	1/11/2012	61	23	27	0.1	29200	5	487	2	56	5	2	150	ND	0.2	ND	28
6	AQ1	3/12/2012	27.3	12.9	22.7	0.1	26900	14.5	572	0.3	22.3	1	0.1	282	ND	1.2	ND	57.4
	AQ2	3/12/2012	37.9	14.3	22.2	0.1	28600	11.8	442	0.3	32.4	1	0.1	222	ND	0.9	ND	50.6
	AQ3	4/12/2012	65.4	36.9	28.2	0.1	54400	1.6	573	0.3	134	1	0.1	514	ND	0.3	ND	68.2
	AQ7	3/12/2012	10.3	8.1	4.1	0.1	7510	0.8	344	0.1	6.4	1	0.1	61	ND	0.1	ND	3.4
	AQ9	3/12/2012	40.3	18.5	11.9	0.1	14300	5.4	806	0.2	24.2	1	0.1	66	ND	0.3	ND	11.6

Event No.	Location	Date	Chromium (mg/kg)	Cobalt (mg/kg)	Copper (mg/kg)	Gold (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Molybdenum (mg/kg)	Nickel (mg/kg)	Selenium (mg/kg)	Silver (mg/kg)	Titanium (mg/kg)	Thallium (mg/kg)	Uranium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
	AQ10	3/12/2012	15.6	7.4	4.4	0.1	8280	1.1	346	0.1	14.8	1	0.1	243	ND	0.2	ND	6
	AQ11	4/12/2012	35.9	11.2	11.4	0.1	16500	2	227	0.2	30.9	1	0.1	170	ND	0.2	ND	15.3
	AQ12	4/12/2012	76.6	30.7	31.9	0.1	39000	4.8	1250	0.8	72.2	1	0.1	213	ND	0.4	ND	39.1
	AQ4	4/12/2012	31.9	14.4	24	0.1	29300	13.9	455	0.4	27.1	1	0.1	280	ND	1.2	ND	61.4
	AQ5	4/12/2012	16.5	8.9	14.4	0.1	19700	10.2	560	0.2	14.7	1	0.1	182	ND	0.8	ND	38.9
	AQ6	4/12/2012	4.7	4.2	3.1	0.1	8640	4.5	108	0.1	2.9	1	0.1	58	ND	0.3	ND	11.7
	AQ8	4/12/2012	67.9	26.2	37.7	0.1	55900	8.8	700	0.3	58.1	1	0.1	341	ND	0.8	ND	81.3
7	AQ7	3/01/2013	10.6	20.4	6.6	0.1	17400	1.8	585	585	13.9	1	0.1	62	ND	0.2	ND	6.5
	AQ11	3/01/2013	28.6	9.5	9.5	0.1	14600	1.6	188	188	26.1	1	0.1	28	ND	0.2	ND	13.2
	AQ6	2/01/2013	3	5.3	4	0.1	15400	5.4	267	267	4.4	1	0.1	64	ND	0.3	ND	13.9
	AQ8	2/01/2013	74.2	29.4	36.5	0.1	68200	8.5	800	800	60.5	1	0.1	248	ND	0.7	ND	87.9
	AQ1	3/01/2013	38.1	17.1	27.5	0.1	42700	14.4	615	615	30.2	1	0.1	193	ND	1.3	ND	65
	AQ12	2/01/2013	86.8	32.4	29.9	0.1	43100	3.7	1010	1010	84.8	1	0.1	230	ND	0.4	ND	45.7
	AQ2	2/01/2013	37.1	14	21.8	0.1	28300	11.4	357	357	30.9	1	0.1	239	ND	1.1	ND	49.2
	AQ3	2/01/2013	71.5	32.9	24	0.1	49200	1.5	441	441	135	1	0.1	546	ND	0.3	ND	63.4
	AQ5	3/01/2013	23	11.4	18.6	0.1	28600	12.4	748	748	18.7	1	0.1	234	ND	1	ND	52
	AQ4	2/01/2013	100	35.3	46.5	0.1	58300	4.9	1600	1600	98.7	1	0.1	917	ND	0.4	ND	55.6
	AQ9	2/01/2013	47.1	18.3	11.9	0.1	18700	5.2	643	643	24	1	0.1	73	ND	0.3	ND	12.9
	AQ10	2/01/2013	19	15.8	7.6	0.1	11100	1.6	851	851	24.3	1	0.1	196	ND	0.4	ND	7.5



Event No.	Location	Date	Sulfate as SO4 (mg/kg)	Total Recoverable Hg (mg/kg)	Fluoride (mg/kg)	Ammonia as N by Discrete Analyser	Nitrite as N by Discrete Analyser (EK057G)	Nitrate as N by Discrete Analyser (EK058G)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser	Total Kjeldahl Nitrogen By Discrete Analyser	Total Nitrogen as N (TKN + NOx) by Discrete Analyser	Total Phosphorus as P by Discrete Analyser
1	TAS1	28/09/2011	ND	0.1	240	20	0.1	15.8	15.9	570	580	349
	TAS2	28/09/2011	ND	0.1	150	20	0.1	13.7	13.7	580	590	298
	TAS3	27/09/2011	ND	0.1	70	20	0.1	2.5	2.6	2530	2530	678
	TAS4	27/09/2011	ND	0.1	170	20	0.8	7.3	8.1	2250	2260	596
	TAS5	27/09/2011	ND	0.1	60	20	0.1	1	1	20	20	275
	TAS6	28/09/2011	ND	0.1	180	20	0.1	0.1	0.1	920	920	399
	TAS7	28/09/2011	ND	0.1	60	20	0.1	0.3	0.3	40	40	24
	TAS8	27/09/2011	ND	0.1	160	40	0.1	0.1	0.1	1980	1980	1110
	TAS9	28/09/2011	ND	0.1	90	20	0.1	1.1	1.2	200	200	112
	TAS10	29/09/2011	ND	0.1	80	20	0.1	0.2	0.2	120	120	124
	TAS11	29/09/2011	ND	0.1	60	20	0.1	0.1	0.1	100	100	77
	TAS12	29/09/2011	ND	0.1	80	20	0.1	0.2	0.2	1520	1520	324
2	AQ8	29/02/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ13	29/02/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ1	3/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ4	4/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ11	3/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ2	3/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ5	1/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ10	2/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ7	2/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ9	2/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ6	1/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
	AQ3	1/03/2012	ND	0.1	ND	ND	ND	ND	ND	ND	ND	ND
3	TAS1	4/06/2012	ND	0.1	60	20	0.1	1.3	1.3	330	330	241
	TAS2	4/06/2012	ND	0.1	240	20	0.1	8.6	8.6	1620	1630	424
	TAS3	4/06/2012	ND	0.1	110	20	0.2	11.6	11.8	1840	1850	769
	TAS7	4/06/2012	ND	0.1	40	20	0.1	0.4	0.4	40	40	122
	TAS8	4/06/2012	ND	0.1	120	20	0.1	2.2	2.2	1970	1970	484
	TAS9A	4/06/2012	ND	0.1	80	20	0.1	1.7	1.7	210	210	73
	TAS9B	4/06/2012	ND	0.1	40	20	0.1	0.7	0.7	50	50	86
	TAS10	4/06/2012	ND	0.1	60	20	0.1	0.1	0.1	180	180	222
	TAS12	4/06/2012	ND	0.1	100	20	0.1	3.3	3.3	1030	1030	257
	TAS13	4/06/2012	ND	0.1	40	20	0.1	0.2	0.2	30	30	40
	TAS14	4/06/2012	ND	0.1	40	30	1.7	6	7.7	1130	1140	311
4	TAS1	4/10/2012	190	0.1	90	20	0.1	2.8	2.8	180	180	271
	TAS2	4/10/2012	340	0.1	240	20	0.1	0.5	0.5	1010	1010	370
	TAS3	4/10/2012	340	0.1	90	20	0.2	35.8	36	410	450	595
	TAS7	4/10/2012	100	0.1	40	20	0.1	0.3	0.3	30	30	63
	TAS9	5/10/2012	100	0.1	40	20	0.1	0.2	0.2	20	20	63
	TAS10	4/10/2012	120	0.1	50	20	0.1	1	1	110	110	165
	TAS11	4/10/2012	350	0.1	60	20	1.2	8.8	10	390	400	216
	TAS12	4/10/2012	530	0.1	100	20	0.1	0.3	0.3	1790	1790	426
5	AQ1	1/11/2012	270	0.1	1	20	0.1	0.1	0.1	1140	1140	358
	AQ2	1/11/2012	290	0.1	1	20	0.1	0.2	0.2	930	930	356
	AQ3	1/11/2012	490	0.1	1	210	0.1	0.1	0.1	3000	3000	971
	AQ4	2/11/2012	270	0.1	1	30	0.1	0.1	0.1	790	790	335
	AQ5	2/11/2012	100	0.1	1	20	0.1	0.1	0.1	40	40	192
	AQ6	2/11/2012	100	0.1	1	20	0.1	0.1	0.1	40	40	194
	AQ7	1/11/2012	100	0.1	1	20	0.1	0.6	0.6	30	30	71
	AQ8	2/11/2012	590	0.1	2	160	0.1	0.1	0.1	3880	3880	852
	AQ9	2/11/2012	180	0.1	2	20	0.1	1.7	1.7	560	560	167
	AQ10	1/11/2012	120	0.1	1	20	0.2	0.1	0.2	110	110	176
	AQ11	2/11/2012	420	0.1	2	20	0.1	0.1	0.1	660	660	160
	AQ12	1/11/2012	500	0.1	3	20	0.1	0.1	0.1	1870	1870	332
6	AQ1	3/12/2012	670	0.1	260	20	0.2	0.2	0.4	830	830	267
	AQ2	3/12/2012	710	0.1	190	20	0.1	2.1	2.1	1750	1750	581
	AQ3	4/12/2012	640	0.1	120	20	0.1	0.3	0.3	1760	1760	1030

Event No.	Location	Date	Sulfate as SO4 (mg/kg)	Total Recoverable Hg (mg/kg)	Fluoride (mg/kg)	Ammonia as N by Discrete Analyser	Nitrite as N by Discrete Analyser (EK057G)	Nitrate as N by Discrete Analyser (EKO58G)	Nitrite plus Nitrate as N (NOx) by Discrete Analyser	Total Kjeldahl Nitrogen By Discrete Analyser	Total Nitrogen as N (TKN + NOx) by Discrete Analyser	Total Phosphorus as P by Discrete Analyser
	AQ7	3/12/2012	200	0.1	40	20	0.1	0.3	0.3	20	20	63
	AQ9	3/12/2012	320	0.1	120	20	0.1	3.3	3.3	200	200	101
	AQ10	3/12/2012	330	0.1	40	20	0.1	0.1	0.1	80	80	60
	AQ11	4/12/2012	600	0.1	80	20	0.1	0.1	0.1	210	210	96
	AQ12	4/12/2012	1420	0.1	110	40	0.1	0.4	0.4	2980	2980	470
	AQ4	4/12/2012	720	0.1	300	20	0.1	0.4	0.4	1560	1560	455
	AQ5	4/12/2012	500	0.1	160	20	0.1	0.1	0.1	940	940	363
	AQ6	4/12/2012	220	0.1	90	20	0.1	0.1	0.1	50	50	243
	AQ8	4/12/2012	610	0.1	250	20	0.1	50.9	50.9	1720	1770	1050
7	AQ7	3/01/2013	200	0.1	40	20	0.1	0.4	0.4	50	50	50
	AQ11	3/01/2013	630	0.1	60	20	0.1	0.2	0.2	370	370	81
	AQ6	2/01/2013	220	0.1	70	20	0.1	0.1	0.1	80	80	161
	AQ8	2/01/2013	800	0.1	210	50	2.8	46.4	49.2	1550	1600	895
	AQ1	3/01/2013	440	0.1	250	20	0.1	0.2	0.3	1150	1150	489
	AQ12	2/01/2013	840	0.1	100	20	0.1	0.4	0.4	2460	2460	366
	AQ2	2/01/2013	520	0.1	210	20	0.1	0.8	0.8	1270	1270	278
	AQ3	2/01/2013	470	0.1	90	20	0.1	0.1	0.1	2940	2940	672
	AQ5	3/01/2013	710	0.1	220	20	0.3	0.2	0.5	1090	1090	360
	AQ4	2/01/2013	470	0.1	110	20	0.2	0.1	0.3	1230	1230	316
	AQ9	2/01/2013	240	0.1	100	20	0.1	2.5	2.6	480	480	122
	AQ10	2/01/2013	260	0.1	50	20	0.1	0.1	0.1	270	270	165

Appendix E Flora Species List

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey												Dry Season Survey											
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12
Aizoaceae	<i>Trianthema portulacastrum</i> *	Black Pigweed													X														
Amaranthaceae	<i>Alternanthera nodiflora</i>	Common Joyweed																			X								
Apiaceae	<i>Centella asiatica</i>																			X									
Apocynaceae	<i>Asclepias curassavica</i> *	Red-head Cottonbush																X											
Apocynaceae	<i>Carissa ovata</i>	Currant Bush								X		X														X			
Asteraceae	<i>Bidens pilosa</i> *	Cobbler's Pegs						X												X									
Asteraceae	<i>Calotis cuneifolia</i>	Burr Daisy														X													
Asteraceae	<i>Conyza bonariensis</i> *	Flaxleaf Fleabane						X							X														
Asteraceae	<i>Eclipta prostrata</i>	White Eclipta													X														
Asteraceae	<i>Parthenium hysterophorus</i> *	Parthenium			Class 2		X	X	X					X															
Asteraceae	<i>Pseudognaphalium luteoalbum</i>	Jersey Cudweed																			X								
Asteraceae	<i>Senecio brigalowensis</i>																			X									
Asteraceae	<i>Senecio madagascariensis</i> *	Fireweed			Class 2																					X	X		
Asteraceae	<i>Silybum marianum</i> *	Variegated Thistle																			X								
Asteraceae	<i>Verbesina encelioides</i> *	Crown Beard														X													
Asteraceae	<i>Xanthium pungens</i> *	Noogoora Burr						X													X								

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey												Dry Season Survey											
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12
Brassicaceae	<i>Rorippa eustylis</i>																X												
Caesalpiniaceae	<i>Lysiphyllum hookeri</i>	Queensland Ebony							X	X	X										X		X						
Caesalpiniaceae	<i>Parkinsonia aculeata</i>	Parkinsonia			Class 2	X							X					X										X	
Caesalpiniaceae	<i>Senna sophera</i> var. (40Mile Scrub J.R.Clarkson+ 6908)									X		X																	
Caryophyllaceae	<i>Spergularia</i> sp.																					X							
Casuarinaceae	<i>Casuarina cristata</i>	Belah				X			X	X											X		X						
Casuarinaceae	<i>Casuarina cunninghamiana</i>	River She-oak														X		X			X								
Celastraceae	<i>Denhamia oleaster</i>																		X										
Chenopodiaceae	<i>Einadia nutans</i> subsp. <i>linifolia</i>														X														
Combretaceae	<i>Terminalia oblongata</i> subsp. <i>Oblongata</i>	Yellow Wood								X																			
Commelinaceae	<i>Commelina diffusa</i>	Native Wandering Jew				X		X																					
Convolvulaceae	<i>Convolvulus graminetus</i>							X																					
Convolvulaceae	<i>Dichondra repens</i>	Kidney Weed						X																					
Convolvulaceae	<i>Evolvulus alsinoides</i>							X																					
Convolvulaceae	<i>Polymeria</i> sp.					X							X																
Cupressaceae	<i>Callitris glaucophylla</i>	White Cypress Pine									X																		

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey													Dry Season Survey											
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	
Cyperaceae	<i>Cyperus pygmaeus</i>																					X								
Cyperaceae	<i>Cyperus concinnus</i>	Trim Flat-sedge															X													
Cyperaceae	<i>Cyperus dactylotes</i>													X																
Cyperaceae	<i>Cyperus exaltatus</i>	Giant Sedge														X														
Cyperaceae	<i>Cyperus fulvus</i>	Sticky Sedge														X														
Cyperaceae	<i>Cyperus gracilis</i>	Slender Flat-sedge				X		X																						
Cyperaceae	<i>Cyperus isabellinus</i>															X														
Cyperaceae	<i>Cyperus javanicus</i>							X									X													
Cyperaceae	<i>Cyperus polystachyos</i>															X														
Cyperaceae	<i>Cyperus rotundus</i> *	Nutgrass				X				X																				
Cyperaceae	<i>Eleocharis acuta</i>																				X									
Cyperaceae	<i>Eleocharis pallens</i>	Pale Spikerush											X																	
Cyperaceae	<i>Fimbristylis dichotoma</i>	Common Fringe-sedge														X														
Cyperaceae	<i>Scleria sphacelata</i>															X														
Erythroxylaceae	<i>Erythroxylum australe</i>	Erythroxylum										X																		
Euphorbiaceae	<i>Euphorbia hirta</i>														X															
Fabaceae	<i>Crotalaria</i> sp.														X															
Fabaceae	<i>Rhyncosia minima</i> var. <i>australis</i>	Ryncho						X																						
Fabaceae	<i>Sesbania cannabina</i>	Sesbania Pea							X																					
Fabaceae	<i>Sesbania</i> sp.							X				X																		
Fabaceae	<i>Stylosanthes viscosa</i> *	Sticky Stylo																			X									

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey													Dry Season Survey																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Haloragaceae	<i>Myriophyllum verrucosum</i>	Water Milfoil																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey													Dry Season Survey											
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	
Moraceae	<i>Ficus coronata</i>	Creek Sandpaper Fig				X		X																						
Moraceae	<i>Ficus opposita</i>	Sandpaper Fig																	X			X								
Myoporaceae	<i>Eremophila longifolia</i>	Dogwood				X		X																						
Myoporaceae	<i>Eremophila mitchellii</i>	False Sandalwood								X																				
Myrtaceae	<i>Corymbia dallachiana</i>								X			X					X						X			X	X			
Myrtaceae	<i>Corymbia tessellaris</i>	Moreton Bay Ash																	X											
Myrtaceae	<i>Eucalyptus camaldulensis subsp. acuta</i>	River Red Gum																X	X			X	X							
Myrtaceae	<i>Eucalyptus cambageana</i>	Blackbutt																		X	X									
Myrtaceae	<i>Eucalyptus coolabah</i>	Coolabah				X	X	X			X							X	X			X	X							
Myrtaceae	<i>Eucalyptus melanophloia</i>	Silver-leaved Ironbark										X								X							X			
Myrtaceae	<i>Eucalyptus moluccana</i>	Gum-topped Box								X																				
Myrtaceae	<i>Eucalyptus populnea</i>	Poplar Box							X	X																				
Myrtaceae	<i>Eucalyptus tereticornis</i>	Forest Red Gum				X		X				X																		

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey										Dry Season Survey													
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12
Myrtaceae	Melaleuca sp.																	X											
Myrtaceae	Melaleuca bracteata	Black Tea Tree						X	X		X	X							X		X		X		X	X	X		
Myrtaceae	Melaleuca trichostachya	River Paperbark									X	X								X	X								
Myrtaceae	Melaleuca viminalis	Weeping Bottlebrush															X												
Onagraceae	Ludwigia octovalvis	Willow Primrose																	X			X							
Orchidaceae	Cymbidium canaliculatum																X												
Poaceae	Aristida lazaridis										X																		
Poaceae	Capillipedium spicigerum	Spicytop				X			X		X																		
Poaceae	Cenchrus ciliaris*	Buffel Grass						X	X	X	X	X		X									X		X				
Poaceae	Chionachne cyathopoda	River Grass																		X									
Poaceae	Chloris divaricata var. divaricata	Slender Chloris													X														
Poaceae	Chloris inflata*	Purpletop Rhodes Grass												X											X				
Poaceae	Chloris virgata	Feathertop Rhodes Grass								X			X																
Poaceae	Cynodon dactylon var. dactylon	Couch										X	X				X		X		X		X						
Poaceae	Dactyloctenium radulans	Button Grass											X																

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey												Dry Season Survey											
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12
Poaceae	<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Queensland Bluegrass						X																					
Poaceae	<i>Digitaria brownii</i>											X																	
Poaceae	<i>Digitaria ciliaris</i> *	Summer Grass				X							X																
Poaceae	<i>Echinochloa colona</i> *	Awnless Barnyard Grass				X				X	X		X																
Poaceae	<i>Eriochloa crebra</i>	Spring Grass											X																
Poaceae	<i>Heteropogon contortus</i>	Black Speargrass						X		X	X																X		
Poaceae	<i>Leptochloa decipiens</i> subsp. <i>Decipiens</i>							X																					
Poaceae	<i>Leptochloa digitata</i>	Umbrella Canegrass					X			X										X		X		X					
Poaceae	<i>Melinis repens</i> *	Red Natal Grass									X								X										
Poaceae	<i>Panicum decompositum</i> var. <i>decompositum</i>						X			X																X			
Poaceae	<i>Panicum decompositum</i> var. <i>tenuius</i>							X			X																		
Poaceae	<i>Panicum larcomianum</i>																			X									
Poaceae	<i>Paspalum distichum</i> *	Water Couch											X																

Family	Species Name	Common Name	EPBC Act Status	NC Act Status	LP Act status	Wet Season Survey										Dry Season Survey												
						AQ02	AQ04	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13	Opps	Opps	TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11
Poaceae	<i>Perotis rara</i>	Comet Grass											X															
Poaceae	<i>Setaria australiensis</i>	Scrub Pigeon Grass													X													
Poaceae	<i>Sorghum halepense</i> *	Johnson Grass						X					X															
Poaceae	<i>Urochloa mosambicensis</i> *	Sabi Grass						X					X															
Polygonaceae	<i>Muehlenbeckia florulenta</i>	Lignum							X									X			X							
Polygonaceae	<i>Persicaria attenuata</i> subsp. <i>Attenuata</i>											X	X				X											
Polygonaceae	<i>Persicaria orientalis</i>	Princes Feathers														X												
Potamogetonaceae	<i>Potamogeton crispus</i>	Curly Pondweed																X										
Rhamnaceae	<i>Alphitonia excelsa</i>	Red ash				X		X				X																
Sapindaceae	<i>Alectryon diversifolius</i>	Holly Bush								X																		
Scrophulariaceae	<i>Mimulus prostratus</i>	Small Monkey Flower																			X							
Solanaceae	<i>Physalis lanceifolia</i>											X																
Solanaceae	<i>Solanum lycopersicum</i> var. <i>cerasiforme</i>																X											
Sparrmanniaceae	<i>Corchorus trilocularis</i>	Wild Jute										X																
Typhaceae	<i>Typha domingensis</i>																							X				
Verbenaceae	<i>Lantana camara</i> *	Lantana			Class 3	X																						
Verbenaceae	<i>Verbena africana</i>							X	X																			

Key:

NC Act	=	<i>Nature Conservation Act 1992</i>
EPBC Act	=	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LP Act	=	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
Opps	=	Opportunistic observation
LC	=	Least Concern
NT	=	Near Threatened
V	=	Vulnerable
E	=	Endangered
*	=	Introduced species
C1	=	Class 1 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>
C2	=	Class 2 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>
C3	=	Class 3 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>

Appendix F Pest Fact Sheets

Cane toads

Bufo marinus



The cane toad (*Bufo marinus*) is not a declared pest in Queensland, so there is no legal requirement to control them.

Their original introduction in 1935 was to control agricultural pests, but they proved ineffective.

For the past 60 years, cane toads have been expanding their territory in Australia, and are capable of colonising at least four of the mainland Australian states.

As the toad's geographical range continues to expand, concern has increased about their detrimental environmental effects, particularly on the wetlands of the Northern Territory.

Studies into the feasibility of biological control have commenced.

History of introduction and spread

The cane toad or giant toad (*Bufo marinus*) is an amphibian, native to Central and South America. They have been introduced throughout the world as a biological control for insect pests of agriculture, most notably sugarcane.

A consignment of cane toads from Hawaii was released into Queensland cane fields in 1935. The introduction was surrounded by controversy as to the potential costs and benefits to Australia.

It was hoped that the toad would control Frenchi and greyback beetles—pests of economic importance to the sugarcane industry.



Queensland Government

By 1941, however, it had become evident that the cane toad was exerting only limited control over its intended prey. There were two main reasons for this:

- Greyback beetles are only rarely in contact with the ground and Frenchi beetles invade cane fields at a time when the toads are absent due to a lack of protective cover.
- The cane toad has a wide-ranging and indiscriminate diet, and it was not solely dependant upon its intended prey.

The unlimited food source, suitable environment and low rates of predation allowed dynamic reproduction and spread. Toads were recorded in Brisbane only 10 years after release. The toad continues to thrive and has now invaded the Northern Territory and New South Wales (see Figure 1).

Figure 1 Current distribution of the cane toad



The cane toad's advance is only limited by environmental factors, such as the availability of water for breeding, tolerable temperatures, suitable shelter and an abundance of food

Toads at the frontier of their range of expansion may be larger than those in established populations. This is most probably due to greater food supply, combined with a lower incidence of disease.

Description and general information

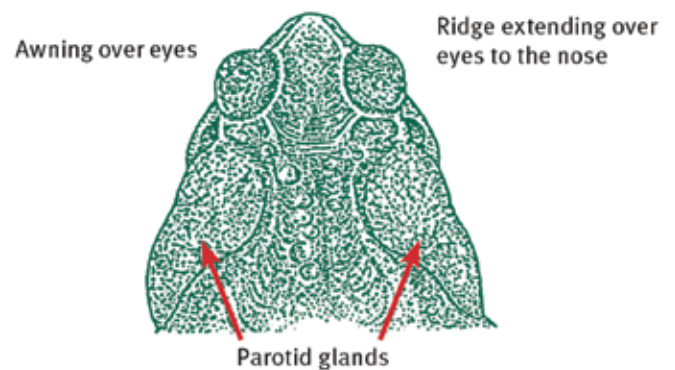
In comparison with native frog and toad species, adult cane toads have a distinctive head and face, and are large and heavily built creatures (adults may grow to 20 cm).

Following their aquatic larval stages (eggs and tadpoles), cane toads are generally encountered at night near any source of light. Cane toads are ground-dwelling—they are poor climbers and unable to jump very high.

A definite visor or awning extends over each eye and a high angular bony ridge extends from the eyes to the nose.

The parotid glands (see Figure 2) are perhaps the most characteristic feature of the adult cane toad. These glands are large, protuberant, and are situated on the head behind each ear. These glands carry a toxin.

Figure 2 Distinguishing features of the cane toad



The cane toad's hands and feet are relatively small and lack discs at the tips of the digits. Webbing is absent between the fingers but is distinct and leathery between the toes.

Colouring on the dorsal (upper) surface may be brown, olive-brown or reddish-brown. The ventral (under) surface varies from white to yellow and is usually mottled with brown.

Warts are present on all cane toads; however, males possess more than females. Warts are dark brown at the caps.

Mating

Mating can occur at any time of the year and depends only on available food and permanent water. The mating call is a continuous purring trill that sounds like a running motor.

In situations where females are scarce or absent, male cane toads may have the ability to undergo a sex change to become fertile females; however, this has not been proved.

Eggs

Both cane toads and native frogs spawn in slow-moving or still water, but their eggs can be easily distinguished.

Cane toad eggs are laid in long, gelatinous ‘strings’ with the developing tadpoles appearing as a row of small black dots along the length. The strings are unique to cane toads, with native frogs eggs laid in clusters, generally appearing as blobs of jelly attached to water plants or debris. Native frogs generally produce egg clusters as mounds of foam floating on the water surface.

Compared with native species, cane toad egg production is dynamic and a single clutch can contain up to 35 000 eggs. Remove any cane toad eggs found in the water and allow to dry out.

Figure 3 Drawing of toad spawn from *Wildlife of greater Brisbane*, page 166



Tadpoles

The cane toad is the only species in Australia that has a pure black tadpole. Native frogs have lighter-coloured undersides with a great range of colours and markings—cane toad tadpoles may turn paler colours to almost transparent at night.

Cane toad tadpoles are small and usually congregate in vast, slow-moving shoals. This ‘shoaling’ behaviour is uncharacteristic of most native species.

Unlike cane toad tadpoles, native species develop lungs at an early stage and periodically rise to the surface in order to exchange their lung gasses. Large groupings of tadpoles that do not break the water surface for air indicate cane toads.

Young toads

Following emergence from the water, the young toadlets usually congregate around the moist perimeter of the water body for about a week before they eventually disperse.

Young toads are very difficult to distinguish from the native *Uperoleia* species, which also have parotid glands, but all *Uperoleia* species have bright red patches in the groin area.

Under ideal conditions toadlets may reach adult size within a year.

Toxicity

Bufo marinus produce venom in glands occurring in most of the skin on their upper surface. The venom is concentrated in the parotid glands as a creamy-white solution, which is released when the animal experiences extreme provocation or direct localised pressure (e.g. grasped by the mouth of a predator).

The parotid solution is highly toxic and when ingested it produces drastic acceleration of the heartbeat, shortness of breath, salivation and prostration. It is extremely painful if accidentally rubbed into the eye.

Ingestion of toads by domestic and most native animals can result in death. In some recorded cases, death has occurred within 15 minutes.

Field observations suggest that some predatory Australian species have learned how to feed safely on cane toads.

Birds have been observed flipping toads over to avoid the parotid glands. Predatory reptiles may have more trouble adapting, being unable to remove a toad from the mouth once they start feeding.

Effects on wildlife

The cane toad is poisonous at all stages of its life cycle and most native frog larvae and many aquatic invertebrates are dramatically affected by their presence.

Cane toads are voracious feeders that consume a wide variety of insects, frogs, small reptiles, mammals and even birds. Perhaps the only limiting factor to the prey taken is the width of the cane toad’s mouth.

It has been suggested that cane toad competition for food and breeding grounds has been responsible for reducing the populations of some native frogs. However, many native frogs are arboreal (tree-dwelling) and occupy different niches. Cane toads don’t have the native frogs’ ability to ‘shut down’ during dry seasons when resources are limited.

Pressure from cane toads may displace native animals (frogs and other species) where they already suffer due to manipulation of their habitat by humans and grazing animals. Animals that use waterholes as retreat sites during the dry season are especially vulnerable—toads will congregate here in large numbers.

Public health

Cane toads readily eat animal and human faecal material and, in areas of poor hygiene, they have been known to transmit disease such as salmonella.

Control

Control of the cane toad has never been enforced and has remained at the discretion of the individual. Recently, the Brisbane City Council established the Cane Toad Eradication Committee that urges residents to exercise greater control of the pest.

Freezing is the most humane form of treatment. As a reaction to cold, cane toads initiate dormancy and eventually die in their sleep.

Fencing is recommended to keep toads out of ponds intended for native fish and frogs; a height of 50 cm is sufficient. Bird wire with 1 cm holes may keep toads out of an area.

CSIRO are investigating organisms for biological control. However, exhaustive testing would be necessary to ensure that viral or bacterial agents are cane toad specific and not harmful to native species.

Injured or 'lost' frogs

Brisbane Forest Park 07 3300 4855

Wildlife Preservation
Society of Queensland 07 3221 0194

Queensland Museum 07 3840 7555

WILVO's Wildlife Volunteer's Organistaion (check your local phone directory to see if a group operates in your area).

Further information

Further information is available from your local government office, or from your local primary industries and fisheries biosecurity officer: contact details are available through 13 25 23.

Fact sheets are available from Queensland Primary Industries and Fisheries service centres and the Queensland Primary Industries and Fisheries Business Information Centre (telephone 13 25 23). Check our website at www.dpi.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this pest fact should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, Queensland Primary Industries and Fisheries does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

Fireweed

Senecio madagascariensis



Fireweed is an introduced weed that competes strongly with pasture species and is toxic to livestock. It is responsible for illness, slow growth and poor conditioning of cattle, and can result in death.

Heavy infestations of fireweed often result from neglect of steadily increasing fireweed infestations in previous years, and lack of good ground cover caused by overgrazing, drought, fire or slashing.

Declaration details

Fireweed is a declared Class 2 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. A Class 2 pest is one that has already spread over substantial areas of Queensland, but its impact is so serious that we need to try and control it and avoid further spread onto properties that are still free of the pest. By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to keep or sell these pests without a permit. A local government may serve a notice upon a landholder requiring control of declared pests.



Queensland Government

Description and general information

Fireweed is an annual or a short-lived perennial. It is a daisy-like herb that can vary greatly in size and shape depending on environmental conditions. In dry, harsh conditions it may be less than 20 cm tall with narrow leaves, no branching and few flowers. In ideal conditions fireweed will grow to 50 cm tall with multiple branches, long wide leaves (6 cm × 2 cm) and about 100 flowers.

The leaves are alternate, dark green with serrated margins, and are usually 2–6 cm long. The flowers are bright yellow, daisy-like with a diameter of approximately 2 cm, and produce up to 100 seeds each. It is very similar to a range of native *Senecio* species.

Seeds are small, cylindrical in shape, and 2–3 mm long. Each seed has rows of very fine short hairs and a silky pappus (parachute). Flowers and seeds are produced continuously over the growing season. An average plant can produce over 10 000 seeds during this time.

Fireweed has a shallow branched taproot with many fibrous roots. The shallow roots often allow plants to fall over in windy conditions. When this happens the stem will sprout roots wherever it touches the ground.

Life cycle

Fireweed can be an annual but many plants do survive through the summer, so plants of all ages can be present at the same time.

Seeds germinate in mild, warm conditions (15–27 °C) in the presence of light and moisture. Most seedlings appear between March and June then grow quickly to produce their first flowers in 6–10 weeks.

Fireweed usually begins to die back in spring. The top growth dies, leaving the base and roots that can last through the summer and re-grow in the following autumn. Depending on rainfall, some plants continue to grow and produce flowers, and seed through summer.

A dry summer followed by autumn or winter rains leads to heavy fireweed infestations.

Poisoning

Unless fireweed poisoning is severe it can be difficult to detect, because the symptoms (such as reduced weight gain and/or low milk production) can have a variety of causes.

Symptoms of more severe poisoning are loss of appetite, aimless wandering, loss of coordination, sensitivity to sunlight, jaundice and abdominal straining with rectal eversion. Severe poisoning will result in death, and an autopsy will reveal chronic liver sclerosis.

All growth stages contain pyrrolizidine alkaloids that damage the liver. Fireweed is toxic when green or dry, therefore contaminated hay or silage may be toxic.

Fireweed is generally unpalatable to cattle, so poisoning is most likely to occur when fireweed plants are dense and stock can not feed selectively, or when there is a shortage of pasture and hungry stock are less selective about food.

Sheep and goats are less susceptible to fireweed poisoning and can graze in fireweed-infested paddocks for at least one season. Toxins found in fireweed are able to taint the milk of goats that graze this plant. Goats for milk production should not be allowed to graze in fireweed-infested paddocks.

Habitat and distribution

Fireweed is native to Madagascar and southern Africa, and was first recorded in Australia in the Hunter Valley in 1918. It is not known how it was introduced, but it could have been brought in privately as a garden plant. It spread slowly at first, but in the last 30 years it has rapidly increased its range, most likely aided by modern transport and rural practices.

Fireweed is a weed of beef and dairy pasture east of the Great Dividing Range, and is currently established along the entire New South Wales coast and north to Brisbane.

Isolated infestations have been found near Caboolture, Cooroy, Belli Park, Maleny, Yandina, Pelican Waters and as far north as Gympie.

Fireweed is spreading northward and has the potential to infest extensive areas of valuable pasture north of Brisbane. A prediction based on climate and land use suggests that fireweed has the potential to be a serious pest as far north as Rockhampton.

Even light infestations of fireweed can produce 1 million seeds per hectare. Seeds are light and have a pappus that enables them to be carried by the wind. The seeds also have rows of short hairs that can loosely cling to animals. Fireweed can be spread short distances by wind and stock. However, it is spread over greater distances in pasture seed, hay, turf, mulch and with stock transport. Fireweed seed can also be spread as a contaminant in transported materials such as hydromulch and grass seed.

Control

Management strategies

The best approach to fireweed control is to prevent it establishing by ensuring that there is a dense cover of pasture in autumn and winter. Waiting until autumn to begin pasture improvement will worsen the fireweed problem because fireweed (which germinates in autumn) will be promoted ahead of the pasture by fertilising and direct drilling of winter pasture species.

When small infestations of fireweed are identified, act immediately to prevent the situation from becoming worse and to increase the likelihood of eradication.

The best control for fireweed incorporates integrated management strategies, including herbicides and mechanical methods in addition to vigorous permanent pastures that can compete strongly with fireweed seedlings.

Biological control

A number of organisms can be found attacking fireweed, but any effect they have is temporary and isolated. An orange rust (*Puccinia lagenophorae*) is common and often affects fireweed, particularly in lower country. The blue stem borer moth (*Patagoniodes farinari*) is also common, but the larvae usually develop too slowly to have an impact. Two moths imported from Madagascar were host tested. In controlled tests they were found to feed on important non-target plants so no releases were made and all these insects were destroyed.

Other potential biological control agents have been identified, but rigorous testing is needed to ensure that they do not feed on closely related Australian native plants. No new agents are expected to be released in the near future.

Mechanical control

Chip out, bag and burn any isolated plants or dispose of them at council-approved landfill tips. You should not burn any toxic plants in household wood-burning stoves or heaters. Remove chipped-out plants from paddocks because they may still set seed and poison stock.

Slashing is usually not effective as it may lead to increased stock poisoning. Slashing tends to give a good visual effect because it removes the flowers, but at best it delays flowering and seeding and at worst damages the pasture, making conditions more favourable for fireweed.

Fireweed remains toxic after being cut and becomes more attractive to stock and thus more likely to cause poisoning.

Herbicide control

Herbicides are most effective if sprayed before plants reach maturity. However, application during flowering will be effective if higher recommended rates of herbicide are applied.

Research is ongoing at the Alan Fletcher Research Station for herbicide controls against fireweed, including residual control methods. Trials have shown herbicide application in the autumn period during April provides good control. Before undertaking such programs landholders are advised to determine the infestation levels.

An effective application method in an open pasture situation is a boom spray. Follow this up by spot spraying, or pulling and bagging any regrowth or missed plants.

Boom spraying is also suitable for follow-up treatments, as it allows destruction of immature plants, which may otherwise grow to re-seed the area before they can be noticed.

Bromoxynil (trade names Bromicide 200, Brominil 200 and Buctril 200) is suitable for use in pastures containing clovers, medics and lucerne, and it will not affect grass.

Bromoxynil is effective if used on seedlings, which usually appear in autumn and early winter but may appear later following rain. Twice as much bromoxynil is needed if it is applied to plants that are just beginning to flower. Bromoxynil is less effective on mature plants, as it is a contact herbicide only. Mature plants will only be killed off where the bromoxynil comes into contact with the plant, allowing recovery of the plant from lower, untouched portions.

Unfortunately, fireweed control is often not considered until the highly visible flowers appear and it is too late for effective control with herbicide.

Table 1 (overleaf) lists herbicides registered for fireweed control. Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

Table 1 Herbicides registered for the control of fireweed

Situation	Herbicide	Rate	Registration status	Comments
Agricultural non-crop land, bushland, forests, wetlands, coastal and adjacent areas	2,4-D (625 g/L)	300 ml/100 L water or 3 L/ha	PERMIT 11463	Spot spray only.
Agricultural non-crop land, commercial and industrial land, forests, pastures and right-of-way areas	Aminopyralid (10 g/L) + fluroxypyr (333 g/L)	500 ml/100 L water	Registered	Apply as a high-volume or spot spray to flowering plants up to 30 cm tall.
Agricultural non-crop land, commercial and industrial land, forests, pastures and right-of-way areas	Triclopyr (300 g/L) + picloram (100 g/L) + aminopyralid (10 g/L)	350 ml/100 L water	Registered	Apply as a high-volume or spot spray when the plant is flowering.
Agricultural non-crop land and pastures	2,4-D (300 g/L)	700 ml/100 L water	Registered	Apply as a high-volume spray when the plant is actively growing.
Pastures and improved pastures (containing clover and/or lucerne)	Bromoxynil (200 g/L)	1.4 L/ha seedling control, 2.8 L/ha for early flowering plants	Registered	Apply during the autumn–winter period when plants are young and actively growing. Not effective on mature plants.
Improved pastures (containing clover and/or lucerne)	Bromoxynil (250 g/L) + diflufenican (25 g/L)	500 ml/ha	Registered	Seedling control up to the four leaf stage
Improved pastures (containing clover)	MCPA (250 g/L) + diflufenican (25 g/L)	1 L/ha	Registered	Seedling control up to the four leaf stage

It is a requirement of a permit that all persons using the products covered by the off-label permit PER11463 comply with the details and conditions listed in the permit. In addition, read the herbicide label carefully before use and always use the herbicide in accordance with label directions. The above permit can be used by pest control operators, members of environmental groups such as Bushcare, Catchment Care, Coast Care, and people employed as or working under supervision of local and state government officers.

Fact sheets are available from Department of Employment, Economic Development and Innovation (DEEDI) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at www.biosecurty.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DEEDI does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

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PR11–5583

Lantana

Lantana camara



Currently, lantana covers more than 5 million ha of the east coast from southern New South Wales to Far North Queensland. Small infestations of lantana have also been found in central west Queensland, the Northern Territory, Western Australia, South Australia and Victoria. Efforts are under way to control these.

Lantana is mainly spread by people (as ornamental plants) and fruit-eating birds. It forms dense thickets that smother and kill native vegetation and are impenetrable to animals, people and vehicles.

Research indicates more than 1400 native species are negatively affected by lantana invasion, including many endangered and threatened species. As lantana is a woody shrub that has thin, combustible canes, its presence can also create hotter bushfires.

Declaration details

All lantana species are declared Class 3 plants under the *Land Protection (Pest and Stock Route Management) Act 2002*. Lantana species cannot be sold or distributed and landholders may be required to control these plants if they pose a threat to an environmentally significant area.

Description and general information

Lantana is a heavily branched shrub that can grow in compact clumps, dense thickets or as a climbing vine.

The stems are square in cross section, with small, recurved prickles. Most leaves are about 6 cm long and are covered in fine hairs. They are bright green above, paler beneath and have round-toothed edges. Leaves grow opposite one another along the stem. When crushed the leaves produce a distinctive odour.

Flowers appear throughout most of the year in clustered, compact heads about 2.5 cm in diameter. Flower colours vary from pale cream to yellow, white, pink, orange and red. Lantana produces round, berry-like fruit that turn from glossy green to purplish-black when ripe.

For rural producers, lantana poses problems of stock poisoning and invasion of desirable pasture. An economic impact assessment indicated lantana costs the Queensland grazing sector in excess of \$70 million (2005–06 values) per year. It is now illegal to sell or distribute any variety of lantana in Queensland. However, garden plantings are still common in many areas and have the potential to cause problems of their own.



Despite being sold and marketed as ‘sterile’ plants, research indicates some ornamental lantana varieties have the ability to set seed and can spread vegetatively. They also produce some viable pollen and have the potential to cross-pollinate with wild forms, creating new varieties that could naturalise in the environment.

If the number of naturalised varieties increases due to genetic drift from ornamental varieties it will make finding effective biological control agents even more difficult, and potentially extend the climatic tolerances and range of the weed’s spread.

Habitat and distribution

Lantana is native to the tropical and subtropical regions of Central and South America.

It is found throughout most coastal and subcoastal areas of eastern Australia, from Far North Queensland to southern New South Wales. It grows in a wide variety of habitats, from exposed dry hillsides to wet, heavily shaded gullies.

Toxicity

Many lantana varieties are poisonous to stock. It is difficult to tell which varieties are toxic so it is better to treat all forms as potentially poisonous. The toxins in lantana include the triterpene acids, lantadene A (rehmannic acid), lantadene B, and their reduced forms.

Most cases of lantana poisoning occur when new stock are introduced into lantana-infested areas. Stock bred on lantana-infested country avoid lantana unless forced to eat it due to lack of other fodder. Young animals introduced to lantana areas are most at risk.

Symptoms of lantana poisoning depend on the quantity and type of lantana consumed and, under some circumstances, the intensity of light to which the animals are exposed.

Early symptoms of depression are noticeable, with head swaying, loss of appetite, constipation and frequent urination. After a day or two the eyes and the skin of the nose and mouth start yellowing with jaundice, and the muzzle becomes dry and warm. The eyes may become inflamed and have a slight discharge. The animal also becomes increasingly sensitive to light. Finally, the muzzle becomes inflamed, moist and very painful (‘pink nose’). Areas of skin may peel and slough off. Death commonly occurs 1–4 weeks after symptoms occur. Death from acute poisoning can occur 3–4 days after eating the plant.

If animals show any of the early symptoms, they should be moved to lantana-free areas, kept in the shade and monitored. Veterinary treatment should be sought immediately. Some remedies may include intravenous fluids, treating skin damage with antibiotics, or drenching with an activated charcoal slurry.

Care should be taken when introducing new or young animals into a paddock if lantana is present. Ensure they have enough fodder to stop them eating lantana in quantities sufficient to result in poisoning. During drought, animals should not be placed in lantana-infested areas without alternative food.

Control

Using a mix (integration) of control methods gives the best results. Size, density and geographic location of infestations are important considerations for choosing which control methods to use. A general principle is to commence control programs in areas of light infestations and work towards the denser infestations.

For large lantana infestations, treatment with herbicides by foliar spraying is usually not economically feasible. However, fire, dozing/stick raking, slashing/cutting, aerial helicopter spraying can reduce dense infestations, making follow-up spot treatments with chemicals more economically viable.

Lantana seed banks remain viable for at *least* four years, so follow-up control to kill seedlings before they mature is vital to ensure initial management efforts to control the parent bush are not wasted.

Appropriate fire regimes may become part of a management program to ensure lantana invasiveness is reduced and pasture is maintained.

Removal of lantana within areas of remnant vegetation may require a permit under the *Vegetation Management Act 1999*. Further information should be sought from the Department of Environment and Resource Management before works commence.

Mechanical control

Stick raking or ploughing can be effective in removing standing plants. However, regrowth from stumps and/or increased seedling germination in disturbed soil is common and the site will require follow-up treatment.

Grubbing of small infestations—for example, along fence lines—can be a useful and effective method of removing plants, though this is time consuming.

Repeated slashing can also reduce the vigour of lantana, exhausting its stored resources and reducing its likelihood of re-shooting.

Some locations—for example, very steep inclines or gullies—are not suitable for mechanical control options because of the danger of overturning machinery and soil erosion.

Fire

Regular burning will reduce the capacity of plants to survive; however, initial kill rates are variable.

The effectiveness of this method will depend on the suitability of available fuel loads, fire intensity, temperature, relative humidity, soil moisture and season. Pasture re-establishment can then provide competition to inhibit lantana seed germination.

Fire is not recommended in non-fire tolerant vegetated areas such as rainforest, or wooded or plantation areas.

A typical control program for fire may include:

- exclude stock to establish a pasture fuel load
- burning (may require a permit)
- sow improved pastures—consult your local Biosecurity Queensland officer for advice
- continue to exclude stock until pasture has established and seeded
- burn again in summer before rain and spot spray lantana regrowth when > 0.5 m high and when it is actively growing (see Table 1).

Herbicide control

Herbicide recommendations for lantana are shown in Table 1. Users of herbicides have a legal obligation to read herbicide labels and use only the registered rates. Always use herbicides responsibly; adhere to legislation and safety requirements.

Variation in results can be a result of inconsistent application methods, mix rates or seasonal variation. Red-flowered and pink-edged red-flowered lantana are often considered the most difficult to control because their leaves are often smaller and tougher. However, herbicides can kill these varieties if you carefully follow application procedures.

For single-stemmed lantana, basal bark spraying and cut stump methods also give good results at any time of year (but best when the plant is actively growing). On multi-stemmed varieties, you will obtain best results by carefully applying herbicide to each stem.

When treating actively growing plants less than 2 m high, overall spraying of foliage to the point of run-off is recommended. Splatter gun techniques are also effective and particularly useful in hard-to-access areas. This is best done in autumn—when sap flows draw the poison down into the root stock, but before night temperatures get too cold.

Remove grazing animals from spray areas during and soon after treatment. Stress can cause increased sugar levels in the leaves of lantana plants, making them more palatable.

Landholders and contractors should check if the property is situated in a hazardous area. This prevents the use of some chemicals, as defined in the *Agricultural Chemicals Distribution Control Act 1966*.

Biological control

Since 1914, 31 biological control agents have been introduced into Australia in an attempt to control lantana. Seventeen have established, of which several insect species cause seasonal damage, reducing the vigour and competitiveness of lantana in some areas.

Biosecurity Queensland research programs continue to investigate agents suitable for release in Australia, and test the viability of these agents in an effort to identify more effective biological control agents.

It is important to remember that biological control alone should not be relied upon for managing lantana infestations. Consideration should be given to other available control techniques.

The four most important biological control agents are:

- **sap-sucking bug (*Teleonemia scrupulosa*)**
Found in dry areas from Cooktown to Wollongong, this small, mottled, bug feeds on the underside of leaves, growing tips and flower buds, causing the leaves to drop early and stopping the plant from flowering.
- **leaf-mining beetle (*Uroplata girardi*)**
Found in most lantana infestations from Cape Tribulation to Sydney as well as around Darwin, except in very dry or high altitude areas. The adult beetles are dark brown. They shelter in curled leaves and feed on the upper leaf surfaces. Larvae feed in leaves causing blotches to spread across the leaf. This beetle reduces plant vigour and can suppress flowering.
- **leaf-mining beetle (*Octotoma scabripennis*)**
Found in most lantana infestations from Atherton to Wollongong. Adults of this species feed on the upper leaf surface, while larvae feed and mine the centre of the leaf and cause blotches. This activity reduces plant vigour and can suppress flowering.
- **seed-feeding fly (*Ophiomyia lantanae*)**
Found from Cape Tribulation to Eden in New South Wales and also around Darwin and Perth. *Ophiomyia* is a small black fly that feeds on flowers and lays eggs on the green fruits. The maggots of the fly eat the seed and make the fruit unattractive to birds, reducing seed spread.

Other agents such as *Aconophora compressa* (a stem-sucking bug) and *Leptobyrsa decora* (a sap-sucking bug) have caused some damage in specific geographic areas.

Note: Landholders are advised not to consume their time collecting established insects for distribution. Due to their own ability to disperse, these insects will be periodically/seasonally present in areas that are climatically suitable for them.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

Table 1. Herbicides for control of lantana

Method of application: active ingredient (trade name) ^a	Rate	Optimum time ^b	Remarks
Foliar (overall) spray			
Fluroxypyr (Starane® 200)	0.5 L to 1 L/100 L water	December to April	Thorough wetting of plants is required, higher rate should be used for larger plants
Glyphosate (Roundup® 360, Glyphosate 360®)	1 L/100 L water	October to April	Wet plant thoroughly. Glyphosate affects any green plant it comes into contact with. Glyphosate is available in a range of strengths
Picloram + 2,4-D (Tordon® 75-D)	0.65 L/100 L water	February to April	Wet plant thoroughly. Legumes are affected if sprayed
Dichlorprop (Lantana® 600)	0.5 L/100 L water	December to April	Must thoroughly wet all leaves. Please refer to product label for situation details
Picloram + triclopyr + aminopyralid (Grazon Extra®)	0.35 L to 0.5 L/100 L water	February to April	Wet plant thoroughly. Use the higher rate on larger plants. Legumes may be affected if sprayed
2,4-D amine (Amicide® 625)	0.32 L/100 L water	March to May	Red-flowered lantanas are more resistant to 2,4-D. Will kill young legumes
Metsulfuron methyl, (Brush-off®, Brushkiller® 600, Lynx® 600)	10 g/100 L water ^b	March to May	Results variable. Not found effective in tropics. Follow-up sprays are necessary
Metsulfuron methyl + glyphosate (Cutout®)	95 g/100 L water	March to May	Apply to bushes up to 2 m tall. Spray to thoroughly wet all foliage and stems. Spray to penetrate throughout the bush
Metsulfuron methyl + glyphosate (Trounce®)	173 g/100 L water	March to May	Apply when actively growing. Do not apply during periods of stress
Aminopyralid + fluroxypyr (Hotshot®)	0.5 L to 0.7 L/100 L water	October to April	Spray all foliage, including stems, to the point of run-off
(i) Basal bark (ii) Cut stump			
Triclopyr (Garlon 600®)	1 L/60 L diesel	Any time. Best results when actively growing	(i) Apply to lower 40 cm of every stem. Must ensure complete coverage around stem (ii) Cut close to ground level. Immediately apply herbicide
2,4-D ester (AF Rubber Vine Spray®)	2.5 L/100 L diesel	Any time. Best results when actively growing	As above
Picloram + Triclopyr (Access®)	1 L/60 L diesel	Any time. Best results when actively growing	As above
Picloram (Vigilant® Herbicide Gel)	3 mm to 5 mm gel	Any time. Best results when actively growing	(ii) If diameter of stump is > 20 mm, use a minimum of 5 mm gel thickness
Glyphosate (Roundup®, Weedmaster Duo®)	Neat	Any time. Best results when actively growing	Off-label permit
Splatter gun			
Glyphosate (Roundup® 360)	1:9 glyphosate + water	October to April	2 x 2 ml dose per 0.5 m height of lantana
Metsulfuron methyl (Brushkiller® 600, Lynx® 600)	2 g/L water	March to May	As above
Aerial			
Picloram + triclopyr + 2,4-D (Grazon® DS + 2,4-D amine 625 g/L)	1.5 L + 6 L/ha or 10 L/ha (Grazon®)	When plant actively growing	Helicopter only. Minimum of 200 L water per hectare. Follow-up re-spray will be required. Do not burn within six months of treatment
Dichlorprop (Lantana® 600)	6 L to 8 L/ha	When plant actively growing	As above

a Only some common trade names provided.

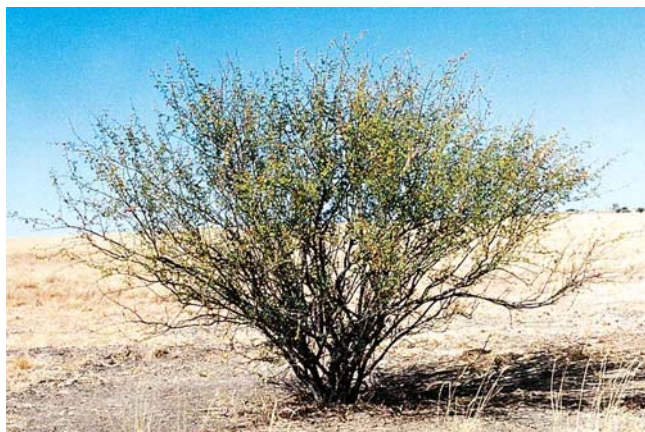
b Optimum times are only a guide. Lantana must be actively growing for the herbicide to work.

® = Registered trade name.

Labels often recommend the additional use of a wetting agent or surfactant within the mix. Herbicides types vary in their selectivity against other species and soil residual.

Fact sheets are available from Department of Employment, Economic Development and Innovation (DEEDI) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at www.biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DEEDI does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

Mimosa bush *Acacia farnesiana*



Description

Mimosa bush (*Acacia farnesiana*) is a rounded shrub or small tree generally growing 3 m tall, occasionally to 5 m. It often forms thorny thickets, and is nearly always multi-stemmed. The branches grow in a zigzag shape and are usually a grey-brown colour with prominent white spots.

Leaves are a ferny type, with 1–6 pairs of leaf "branches" each with 5–20 pairs of narrow, rounded leaflets 4–8 mm long. Leaves are sometimes more of a yellowish green than a pure green. Thorns are found in pairs at the base of each leaf and can grow up to 10 cm long.

Golden yellow to orangeish flowers are ball-shaped, about 1 cm across, and grow on stalks, usually two stalks at the base of each leaf. Flowers develop into clusters of cigar-shaped pods, slightly curved and up to 6 cm long. The pods are dark brown or black and woody at maturity, with seeds embedded in the pith. Pods do not split open and tend to stay on the plant for a length of time.

Mimosa can be confused with the declared weeds mesquite (*Prosopis* spp.) and prickly acacia (*Acacia nilotica*), particularly when young (see the 'Identification of Prickly Bushes' fact sheet).

Distribution

Mimosa bush, a native of central and south America, is naturalised in Australia. It is very widespread in Queensland, and found in all but the wettest and driest parts of the State. Seeds sprout readily and plants grow rapidly. It does well in dry localities and on loamy or sandy soils, forming thickets along watercourses. Mimosa bush withstands drought well, is readily eaten by stock, and has good regrowth after grazing. It is not a long-lived plant. In some parts of the world this bush is cultivated for perfume production.

The problem

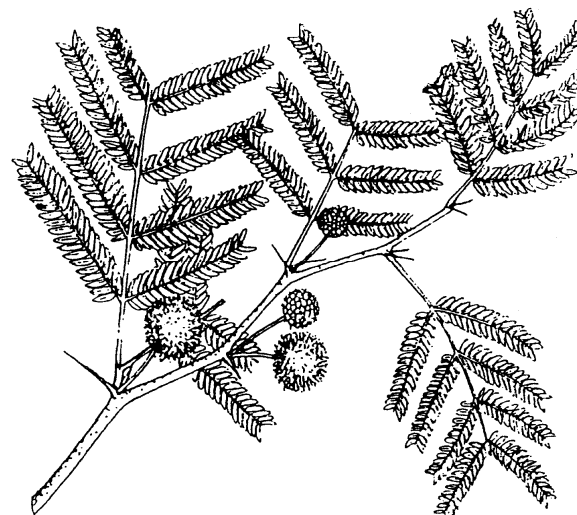
Mimosa bush can spread readily and grow quickly. As it often forms thorny thickets, it can be a considerable nuisance during mustering and can also hinder stock access to water.

Mimosa does offer shade in open downs country and can be useful as a supplement to grass during the dry season. It may therefore be a useful plant in some areas if its spread can be controlled to prevent thicket formation. The maintenance of healthy pasture competition is the best mechanism to achieve this.

Herbicide control

Basal bark spray

For stems up to 15 cm diameter, carefully spray completely around base of plant to a height of 30 cm above ground level. Thoroughly spray into all crevices. Larger trees may be controlled by spraying to a greater height, up to 100 cm above ground level.



The best time for treatment is during autumn when plants are actively growing and soil moisture is good.

Cut stump treatment

At any time of year, cut stems off horizontally as close to the ground as possible. **Immediately** (within 15 seconds) swab cut surface with herbicide mixture.

Bore drains

Channels and drains must be empty of water. Spray a one metre strip into the mud in channel or drain. Wait at least three days for diuron to bond to mud before slowly allowing water in again. Water must not be used in domestic water supply or supplied to desirable shade trees for 7–14 days after re-opening the drain.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

TABLE 1 – HERBICIDES REGISTERED FOR THE CONTROL OF MIMOSA BUSH

	Herbicide	Rate		Remarks (also see text)
Basal bark/cut stump	Fluroxypyr eg. Starane 200®, Tomigan 200 EC®, Flagship 200®.	3 L/100 L diesel	Basal bark: for plants up to 5cm basal diameter.	
	Triclopyr + picloram eg. Access®	1 L/60 L diesel	Basal bark: for plants up to 5 cm basal diameter.	Ensure all stems on multi-stemmed plants are treated.

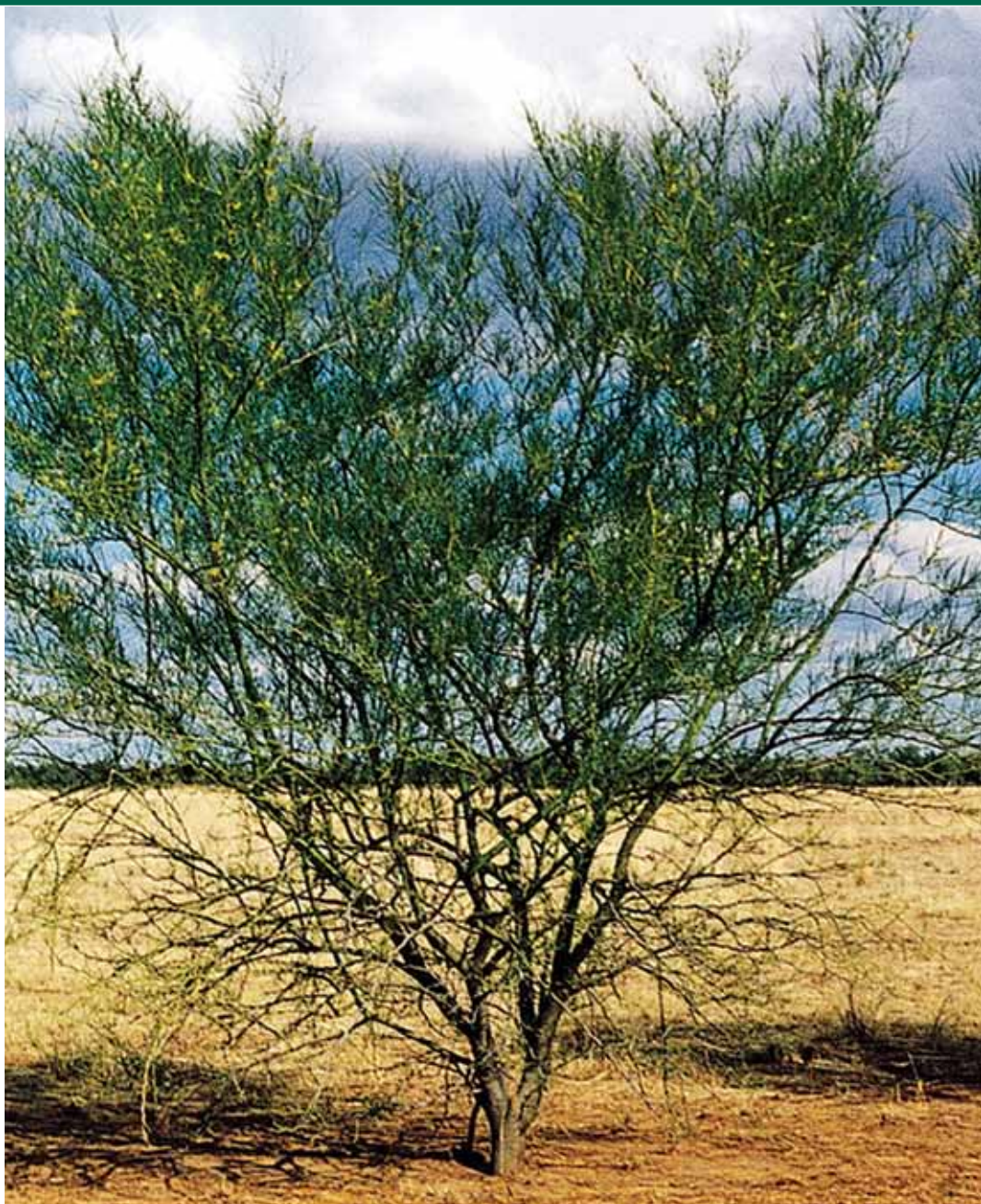
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Parkinsonia

Jerusalem thorn or jelly bean tree

Parkinsonia aculeata



Parkinsonia is thought to be native to tropical America but has spread throughout the world as an ornamental and shade tree. It has been recognised in Australia as a Weed of National Significance.

Declaration details

Parkinsonia is a declared Class 2 plant under *Land Protection (Pest and Stock Route Management) Act 2002*. Declaration requires landholders to control declared pests on the land and waters under their control. A local government may serve a notice upon a landholder requiring control of declared pests.



Queensland Government



Description and general information

Size and appearance

A hairless shrub or small tree that rarely grows any more than 10 m high, Parkinsonia has slender green photosynthetic zigzag branches armed with sharp spines.

Leaves

Its leaves have a short, spine-tipped stalk, with leaf branches 20–40 cm long, flattened with small, oblong leaflets along each edge.

Flowers

Parkinsonia flowers are yellow, fragrant, five petalled, each on a long, slender drooping stalk. Seeds are oval and hard, about 15 mm long, and borne in pencil-like pods 5–10 cm long, constricted between the seeds.

Lifecycle

Parkinsonia is fast growing and may flower in early summer of its second or third year of growth. Once established, flowering can occur opportunistically to exploit variable seasonal conditions. Pods mature in late summer, float on water and hence are readily dispersed by flood waters.

Under favourable warm and wet field conditions, most seeds germinate within 2 years. However, a small proportion of seed may remain dormant for longer periods if it's under heavy pasture cover, buried deeper in the soil profile, when inundated or when insufficient rain has fallen.

Habitat and distribution

As parkinsonia is adapted to an extremely wide range of soil types, there is little doubt that it will continue to spread through watercourses and adjoining areas throughout the sub-humid and semi-arid environments of Queensland.

The most vulnerable areas are the lower Gulf of Carpentaria region, Lake Eyre catchment especially the Channel country, Central Highlands and Cape York.

Control

Biological control

Three species of insects have been introduced into Australia as biological control agents against parkinsonia.

Parkinsonia seed beetles *Penthobruchus germani* and *Mimosetes ulkei*.

Both *Penthobruchus germani* and *Mimosetes ulkei* are seed beetles that attack only parkinsonia and whose larvae destroy mature parkinsonia seeds.

Penthobruchus germani is a small (5 mm – 6 mm long) brown beetle from Argentina. It was first released in 1995 and has established much more readily than *Mimosetes*. It has established readily at all release sites and spreads rapidly.

Penthobruchus can exert heavy pressure on parkinsonia seeds in some areas. In the field its presence is indicated by white eggs against a darker background of the pods. Round holes in the pods indicate that beetles have emerged.

Mimosetes ulkei is a small (about 5 mm long) two-tone grey beetle from the USA. While it is established at several sites, it does not establish as readily as *Penthobruchus*. It has potential to contribute to the destruction of parkinsonia seeds. In the field, round emergence holes are the only external indication of its presence.

Parkinsonia leaf bug *Rhinacloa callicrates* *Rhinacloa callicrates* is a small green bug (about 3 mm long) imported from the USA. It feeds on leaves and shoots of parkinsonia resulting in tiny round white spots where it destroys photosynthetic tissue. It is well established in Queensland but it has no significant impact on parkinsonia.

Further biological control studies

Research has continued in recent years to survey the native range of parkinsonia for potential new agents. Several prospective insects have been identified and will be subject to host-testing studies prior to release.

Dieback research

Naturally occurring fungal pathogens have been identified as causing dieback within many infestations of parkinsonia across Northern Australia. Studies are continuing regarding the use of these pathogens as biological control tools.

Mechanical control

Initial clearing by stick raking, blade ploughing or ripping is effective, however:

- it is restricted to reasonably level areas away from watercourses
- clearing will hasten seed germination, necessitating follow-up control either mechanically or chemically.

Establishing improved pasture will aid in managing parkinsonia by competition.

Fire

Fire may be a useful tool for the management of parkinsonia infestations. Kill rates may vary from 30% to 90% with best results obtained from slow moving fires.

Fire will destroy seedlings if sufficient fuel load is present, but mature plants will usually survive.

Herbicide control

Herbicides registered for the control of parkinsonia are listed in Table 1.

Aerial application

Aerial application is undertaken by purpose-built applicators by helicopter. This is useful for dense, strategic infestations although it may be expensive on a broad scale.

Foliar (overall) spray

This is an effective control method for seedlings up to 1.5 m tall. Spray leaf and stems to point of runoff. A wetting agent must be used.

Basal bark spray

For stems up to 15 cm diameter, carefully spray around the base of the plant to a height of 30 cm above ground level. Larger trees may be controlled by spraying to a greater height, up to 100 cm above ground level.

Plants should be actively growing and preferably flowering. Field experience has shown that good soil moisture is essential for effective control.

Because parkinsonia infested areas are often subject to flooding, care is needed to ensure mud and flood debris does not prevent spray penetration to the bark. The trunk may need to be cleared before spraying. Addition of petrol or A-1 jet fuel will aid penetration.



Cut stump treatment

Cut stump treatment may be performed at any time of the year. Cut stems off horizontally as close to the ground as possible. Immediately (within 15 seconds) swab or spray the cut surface and associated stem with herbicide mixture.

Soil application

Use one dose of herbicide per metre of tree height. Place doses close to tree trunk, either with spot gun on clear bare ground, or underground with ground injector. Rain or sufficient soil moisture is required before herbicide is taken up by the plant.

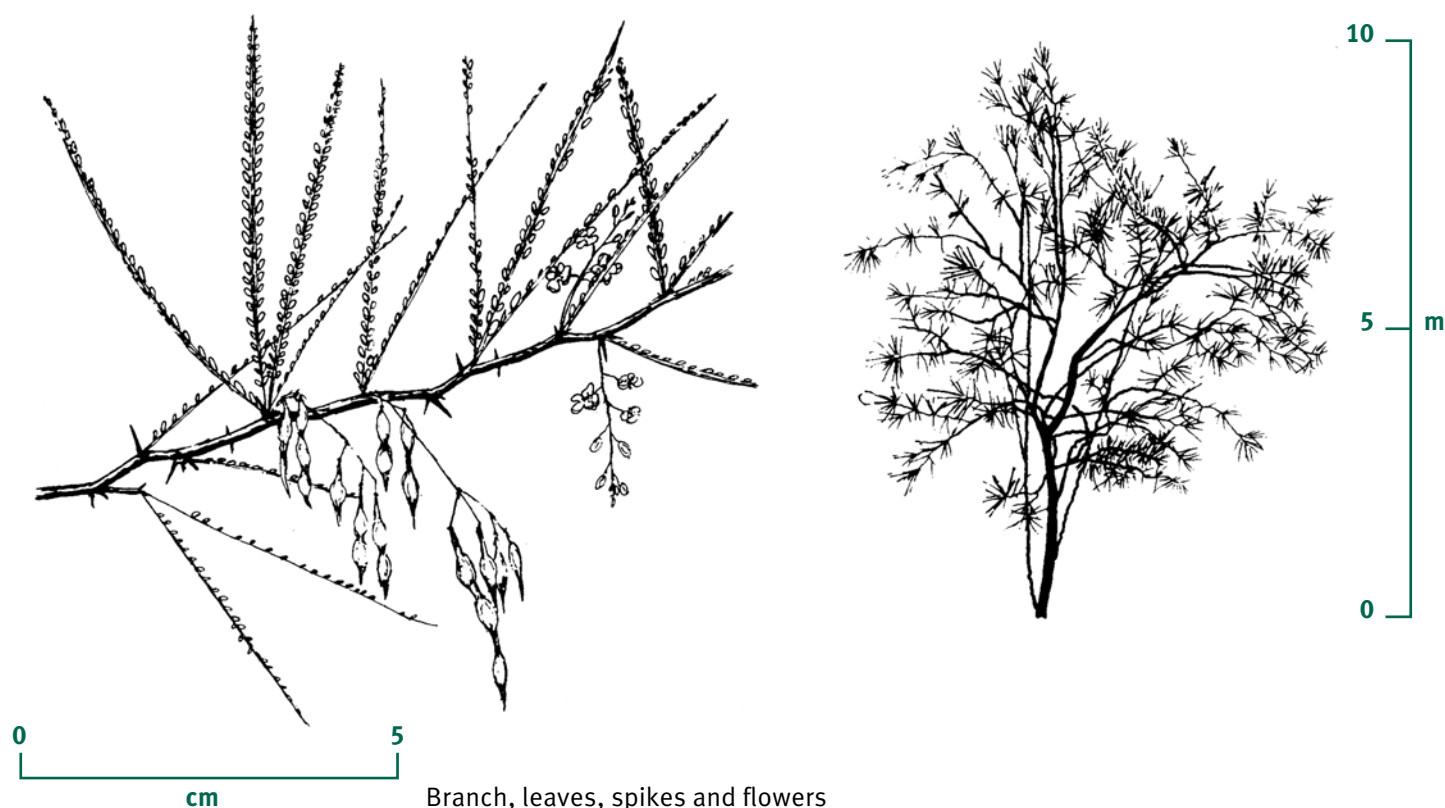
Do not use near watercourses or within a distance equal to at least twice the height of desirable trees.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

Table 1 Herbicides registered for the control of parkinsonia.

Situation	Herbicide	Rate	Optimum stage and time	Comments
Aerial application	Aminopyralid, picloram and tricopyr e.g. Grazon Extra DS®	3 L/ha	Seedlings 1–2 m tall, or 12–24 months old	Application by helicopter only. Addition of 1 L/ha of Uptake® wetting agent
Foliar (overall spray)	Aminopyralid, picloram and tricopyr e.g. Grazon Extra DS®	0.35 L/100 L water	Seedlings less than 2 m tall and actively growing	Wet plant thoroughly. Use wetting agent
Basal bark spray	Triclopyr and picloram e.g. Access®	1 L/60 L diesel	As above. Stems up to 5 cm diameter	Do not treat wet stems
Cut stump	Triclopyr and picloram e.g. Access®	1 L/60 L diesel	Any time of year	Cut close to ground level and treat immediately
Soil application	Hexazinone e.g. Velpar L® (via spotgun)	4 ml per spot—1 spot for each shrub/tree	Any time, but needs moisture to activate chemical	Shrubs/trees up to 5 m tall
	Tebuthiuron e.g. Grazon Extra DS®	1 to 1.5 g/m ²	Any time, but needs moisture to activate chemical	Refer to label for critical comments



Branch, leaves, spikes and flowers

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Parthenium weed

Parthenium hysterophorus



Parthenium costs the beef industry a total of \$16.5 million per year and cropping industries several million dollars per year.

Declaration details

In Queensland, Parthenium is a Class 2 declared plant.

Under the *Land Protection (Pest and Stock Route Management) Act 2002*, Class 2 declaration requires landholders to control pests on the land and waters under their control. A local government may serve a notice upon a landholder requiring control of declared pests.



Queensland Government

Description and general information

Size

Parthenium weed is an annual herb with a deep tap root and an erect stem that becomes woody with age. As it matures, the plant develops many branches in its top half and may eventually reach a height of two metres.

Leaves

Its leaves are pale green, deeply lobed and covered with fine soft hairs.

Flowers

Small creamy white flowers occur on the tips of the numerous stems. Each flower contains four to five black seeds that are wedge-shaped, two millimetres long with two thin, white scales.

Lifecycle

Parthenium weed normally germinates in spring and early summer, produces flowers and seed throughout its life and dies around late autumn. However, with suitable conditions (rain, available moisture, mild temperatures), parthenium weed can grow and produce flowers at any time of the year. In summer, plants can flower and set seed within four weeks of germination, particularly if stressed.

Potential damage

Parthenium weed is a vigorous species that colonises weak pastures with sparse ground cover. It will readily colonise disturbed, bare areas along roadsides and heavily stocked areas around yards and watering points. Parthenium weed can also colonise brigalow, gidgee and softwood scrub soils. Its presence reduces the reliability of improved pasture establishment and reduces pasture production potential.

Parthenium weed is also a health problem as contact with the plant or the pollen can cause serious allergic reactions such as dermatitis and hay fever.

Habitat and distribution

Parthenium weed is capable of growing in most soil types but becomes most dominant in alkaline, clay loam soils.

The plant is well established in Central Queensland and present in isolated infestations west to Longreach and in northern and southern Queensland.

Infestations have also been found in northern and central parts of New South Wales and it is capable of growing in most states of Australia.

Control

Prevention and weed seed spread

As with most weeds, prevention is much cheaper and easier than cure. Pastures maintained in good condition, with high levels of grass crown cover, will

limit parthenium weed colonisation. Drought, and the subsequent reduced pasture cover, creates the ideal window of opportunity for parthenium weed colonisation when good conditions return.

Parthenium seeds can spread via water, vehicles, machinery, stock, feral and native animals and in feed and seed. Drought conditions aid the spread of seed with increased movements of stock fodder and transports.

Vehicles and implements passing through parthenium weed infested areas should be washed down with water. Wash down facilities are located in Alpha, Biloela, Charters Towers, Emerald, Gracemere, Injune, Monto, Moura, Rolleston, Springsure and Taroom. Particular care should be taken with earthmoving machinery and harvesting equipment. The wash down procedure should be confined to one area, so that plants that establish from dislodged seed can be destroyed before they set seed.

Extreme caution should be taken when moving cattle from infested to clean areas. Avoid movement during wet periods as cattle readily transport seed in muddy soil. On arrival, cattle should be held in yards or small paddocks until seed has dropped from their coats and tails prior to their release into large paddocks. Infestations around yards can be easily spotted and controlled whereas infestations can develop unnoticed in large paddocks.

Particular care should be taken when purchasing seed, hay and other fodder materials. Always keep a close watch on areas where hay has been fed out for the emergence of parthenium or other weeds.

Property hygiene is important. Owners of clean properties should ensure that visitors from infested areas do not drive through their properties. If your property has parthenium weed on it, ensure that it is not spread beyond the boundary or further within the property.

Pasture management

Grazing management is the most useful method of controlling large-scale parthenium weed infestations. Maintain pastures in good condition with high levels of ground and grass crown cover. This may require rehabilitation of poor pastures, followed by a sound grazing maintenance program.

Sown pasture establishment—Poor establishment of sown pastures can allow parthenium weed colonisation. pasture agronomist Aerial seeding prior to scrub pulling is normally beneficial.

Overgrazing—High grazing pressure caused by drought or high stock numbers decreases the vigour and competitiveness of pastures and allows the entry and spread of parthenium weed. Maintenance of correct stock numbers is most important in controlling parthenium weed. pasture agronomist

Pastures spelling—In situations of serious infestation, pasture spelling is essential for rehabilitation. Total spelling is much more effective than simply reducing the

stocking rate. However, overgrazing of the remainder of the property must be avoided.

The most appropriate time for pasture spelling is the spring–summer growing period, with the first 6–8 weeks being particularly important. If the condition of perennial grasses (native or sown) is low, spelling for the entire growing season may be required or introduced grasses may need to be re-sown. Herbicide treatment can hasten the rehabilitation process by removing a generation of parthenium seedlings and allowing grass seedlings to establish without competition. In the presence of parthenium weed, grass establishment is poor.

Grazing during winter should not increase the parthenium weed risk. Most tropical grasses are dormant and can tolerate moderate grazing during this period. However, parthenium weed may germinate and grow at this time.

Fencing—One of the main problems in controlling parthenium weed is the large paddock size and the variability of country within paddocks. The resulting uneven grazing pressures encourage parthenium weed to colonise the heavily grazed country. Ideally, similar land types should be fenced as single units. Fencing can be used to great effect to break up large paddocks, allowing more flexible management such as pasture spelling or herbicide application, options not available previously.

Burning—Burning is not promoted as a control strategy for parthenium weed. However, research suggests that burning for pasture management (e.g. woody weed control) should not result in an increased infestation if the pasture is allowed to recover prior to the resumption of grazing. Stocking of recently burnt areas known or suspected to contain parthenium decreases pasture competition and favours parthenium, ultimately creating a more serious infestation.

Herbicide control

Non-crop areas—Parthenium weed should be sprayed early before it can set seed. A close watch should be kept on treated areas for at least two years.

Small and/or isolated infestations should be treated immediately. Herbicide control will involve a knockdown herbicide to kill plants that are present and a residual herbicide to control future germinations. Repeated spraying may be required even within the one growing season to prevent further seed production.

Extensive infestations will require herbicide treatment in conjunction with pasture management. Timing of spraying is critical so that parthenium weed is removed when plants are small and before seeding has occurred. Grasses should be actively growing and seeding so that they can recolonise the infested area.

Table 1 shows the herbicides registered for parthenium weed control and application rates. Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label.

Cropping areas—Controlling parthenium weed in cropland requires selective herbicide use and/or crop rotations. For further information on parthenium weed control in crops consult your local biosecurity officer.

Biological control

The combined effects of biological control agents reduced the density and vigour of parthenium weed and increased grass production.

There are currently a number of insect species and two rust pathogens that have been introduced to control parthenium weed—a selection of these are outlined below.

Epiblema strenuana is a moth introduced from Mexico established in all parthenium weed areas. The moth's larvae feed inside the stem, forming galls that stunt the plant's growth, reduce competitiveness and seed production.

Listronotus setosipennis is a stem-boring weevil from Argentina but is of limited success in reducing parthenium weed infestations.

Zygogramma bicolorata is a defoliating beetle from Mexico which is highly effective where present. It emerges in late spring and is active until autumn.

Smicronyx lutulentus (Mexico) lays eggs in the flower buds where the larvae feed on the seed heads.

Conotrachelus albocinereus (stem-galling weevil from Argentina) produces small galls and is still becoming established in Queensland.

Bucculatrix parthenica (leaf mining moth from Mexico) larvae feed on leaves, leaving clear windows in the leaf.

Carmentia ithacae is a stem boring moth from Mexico which is becoming established at favourable sites in the northern Central Highlands.

Puccinia abrupta is a winter rust from Mexico that infects and damages leaves and stems. It is currently established over a wide area from Clermont south. It requires a night temperature of less than 16 degrees and 5–6 hours of leaf wetness (dew). Sporadic outbreaks occur where weather conditions are suitable.

Puccinia melampodii is a summer rust from Mexico that weakens the plant by damaging the leaves over the summer growing season. It is currently established and spreading at a number of sites from north of Charters Towers to Injune in the south.

Manual control

Hand pulling of small areas is not recommended. There is a health hazard from allergic reactions and a danger that mature seeds will drop off and increase the area of infestation.

Further information

Further information is available from your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

Table 1 Herbicides registered for parthenium weed.

Herbicide	Rate	Situation	Comments
2,4-D amine 500 g/L	0.4 L/100 L	Land—industrial, pastures; rights-of-way	Spot spray
atrazine 500 g/L max 3 kg/ha/yr	3.6–6 L/ha	Fields and fallow	Boom spray
	6 L/ha	Land—industrial, commercial, non-agricultural, roadside, right-of-way	Boom spray
atrazine 900 g/kg max 3 kg/ha/yr	2–3.3 kg/ha	Fields and fallow	Boom spray
	3.3 kg/ha	Land—non-agricultural, commercial, industrial	Boom spray
2,4-D + picloram (Tordon 75-D)	125 ml/100 L	Land—commercial, industrial, pastures, right-of-way	Spot spray
	3 L/ha	Land—commercial, industrial, pastures, right-of-way	Boom spray
2,4-D ester ¹	.025 L/10 L	Land—non-agricultural, pastures	Rosette stage
glyphosate (450 g/L)	0.8–1.2 L/ha	Fields and fallow	Spot spray
metsulfuron methyl	5–7 g/ha	Fields and fallow	Seedlings only
	5 g/100 L	Land—commercial, industrial, pastures, rights-of-way	Spot spray
hexazinone	3.5 L/ha or 7 L/10 L/20 m ²	Land—commercial, industrial, pastures, rights-of-way	Boom spray or spot spray
dicamba (200 g/L) (500 g/L) (700 g/kg)	0.7–2.8 L/ha or 0.1–0.19 L/100L	Grass pastures	Boom spray or spot spray
	0.28–1.1 L/ha or 0.40–0.76 L/100L	Grass pastures	Boom spray or spot spray
	200–800 g/ha or 30–60 g/100 L	Grass pastures	Boom spray or spot spray

¹Use restricted in some areas of Central Queensland

Notes The registered rates are for non-crop uses. Consult label for in-crop recommendations.
For power hand spray or knapsack use, spray plants to the point of runoff.

Fact sheets are available from Department of Employment, Economic Development and Innovation (DEEDI) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at www.biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DEEDI does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

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CS0564

Appendix G Macro-invertebrate Identification Results

Project Name: **AARC ID Sept (variation)**

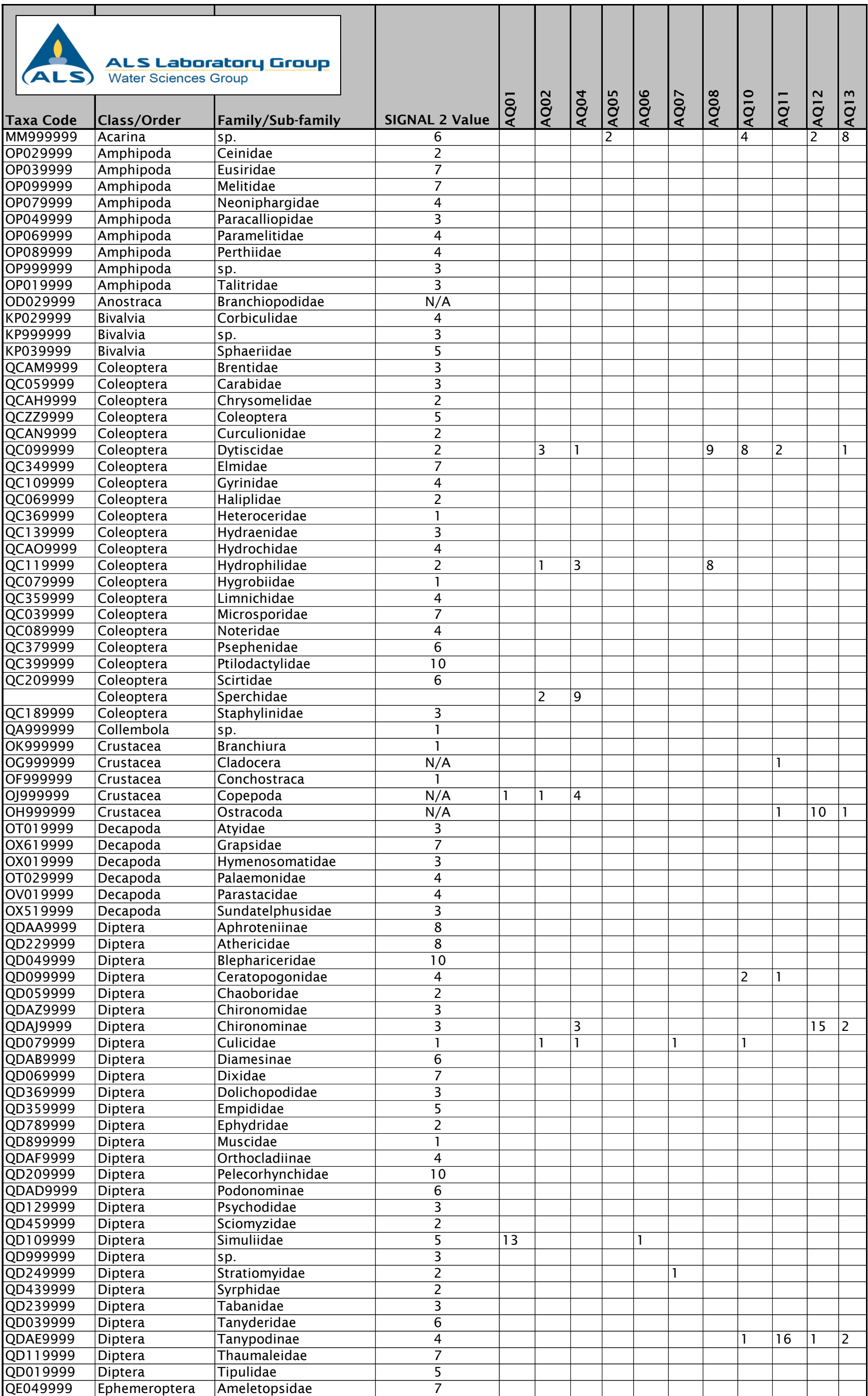
Project Number: 110919

ID QAQC / ref changes: Y

Data entry QA/QC : Y

Do not include in analysis

[illegible]



[illegible]

[illegible]

Appendix H Fauna Species List

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics														Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13		
BIRDS																																
Pacific Black Duck	Anas platyrhynchos				X														X												X	
Darter	Anhinga melanogaster				X														X													
Australasian Darter	Anhinga novaehollandiae				X			X			X																					
Red-winged Parrot	Aprosmictus erythropterus																		X													
Cattle Egret	Ardea ibis	M/Ma			X			X											X													
White-necked Heron	Ardea pacifica				X					X																						
Intermediate Egret	Ardea intermedia				X														X							X						
White-breasted Woodswallow	Artamus leucorynchus							X											X													
Hardhead	Aythya australis				X			X											X													
Galah	Cacatua roseicapilla							X											X													
Sulphur-crested Cockatoo	Cacatua galerita							X											X	X	X	X										
Australian Wood-duck	Chenonetta jubata				X														X											X		
Australian Raven	Corvus coronoides																		X													
Brown Quail	Coturnix ypsilophora																		X			X										
Black Swan	Cygnus atratus				X			X											X			X				X				X	X	

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics														Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13		
Blue-winged Kookaburra	<i>Dacelo leachii</i>				X														X		X											
Laughing Kookaburra	<i>Dacelo novaeguineae</i>				X			X											X													
Plumed Whistling Duck	<i>Dendrocygna cytoni</i>				X														X													
White-faced Heron	<i>Egretta novaehollandiae</i>				X						X								X													
Black-fronted Dotterel	<i>Elseyornis melanops</i>				X												X		X									X				
Blue-faced Honeyeater	<i>Entomyzon cyanotis</i>																			X												
Red-kneed Dotterel	<i>Erythronys cinctus</i>				X														X													
Dollarbird	<i>Eurystomus orientalis</i>																				X											
Nankeen Kestrel	<i>Falco cenchroides</i>																		X													
Australian Hobby	<i>Falco longipennis</i>																		X													
Eurasian Coot	<i>Fulica atra</i>				X														X													
Latham's Snipe	<i>Gallinago hardwickii</i>	M/Ma			X			X											X													
Dusky Moorhen	<i>Gallinula tenebrosa</i>				X														X													
Magpie-lark	<i>Grallina cyanoleuca</i>							X											X			X										
Brolga	<i>Grus rubicunda</i>				X			X											X			X						X	X			
Australian Magpie	<i>Gymnorhina tibicen</i>							X											X		X	X										

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics														Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13		
Black-winged Stilt	<i>Himantopus himantopus</i>				X																								X			
Chestnut-breasted Mannikin	<i>Lonchura castaneothorax</i>				X			X											X													
Red-backed Fairy-wren	<i>Malurus melanocephalus</i>							X											X													
Superb Fairy-wren	<i>Malurus cyaneus</i>							X											X													
Noisy Miner	<i>Manorina melanocephala</i>							X											X													
Nankeen Night Heron	<i>Nycticorax caledonicus</i>				X			X											X													
Crested Pigeon	<i>Ocyphaps lophotes</i>							X											X													
Australian Pelican	<i>Pelacanus conspicillatus</i>				X			X											X													
Little Pied Cormorant	<i>Phalacrocorax melanoleucos</i>				X			X		X	X								X													
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>				X						X								X													
Pied Cormorant	<i>Phalacrocorax varius</i>				X														X		X											
Pale-headed Rosella	<i>Platycercus adscitus</i>							X											X													
Striped Honeyeater	<i>Plectorhyncha lanceolata</i>							X											X													

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics												Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13
Glossy Ibis	<i>Plegadis falcinellus</i>	M/Ma			X													X											X	
Tawny Frogmouth	<i>Podargus strigoides</i>					X												X												
Great Crested Grebe	<i>Podiceps cristatus</i>				X			X										X												
Willie Wagtail	<i>Rhipidura leucophrys</i>							X										X												
Apostlebird	<i>Struthidea cinerea</i>							X										X		X										
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>				X													X												
Double-barred Finch	<i>Taeniopygia bichenovii</i>							X										X			X									
Zebra Finch	<i>Taeniopygia guttata</i>																												X	
Straw-necked Ibis	<i>Threkiornis spinicollis</i>				X													X												
Forest Kingfisher	<i>Todiramphus macleayii</i>				X			X										X												
Sacred Kingfisher	<i>Todiramphus sanctus</i>				X			X										X												
Masked Lapwing	<i>Vanellus miles</i>				X			X										X						X				X		
REPTILES																														
Brown Tree Snake	<i>Boiga irregularis</i>					X												X												
Dubious Dtella	<i>Gehyra dubia</i>					X												X												
	Gekkonidae Sp.					X												X												

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics												Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13
Open Litter Rainbow Skink	<i>Carlia pectoralis</i>																			X										
Keelback	<i>Tropidonophis mairii</i>				X																		X							X
Eastern Snake-necked Turtle	<i>Chelodina longicollis</i>				X																									X
FISH & AQUATICS																														
Bony Bream	<i>Nematalosa erebi</i>				X											X														
Southern Purple-spotted Gudgeon	<i>Mogurnda adspersa</i>				X				X							X			X											X
Spangled Perch	<i>Leiopotherapon unicolor</i>				X			X	X										X	X			X							
Shrimp	<i>Paratya sp.</i>				X															X										X
Yabby	<i>Cherax destructor</i>				X															X										
Freshwater Crab	<i>Austrothelphusa transversa</i>				X														X	X			X							
Agassiz's Glassfish	<i>Ambassis agassizii</i>				X														X	X			X							X
Eastern Rainbowfish	<i>Melanotaenia splendida</i>				X															X										X
Fly-specked Hardyhead	<i>Craterocephalus stercusmuscarum</i>				X																									X
AMPHIBIANS																														
Cane Toad	<i>Rhinella marina*</i>				X	X											X	X	X				X							X
Spotted Marsh Frog	<i>Limnodynastes tasmaniensis</i>				X												X	X	X											

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics														Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13		
Green Tree Frog	Litoria caerulea				X	X												X														
Person's Tree Frog	Litoria peronii				X														X	X												
Greenstripe Frog	Cyclorana alboguttata				X															X			X	X						X		
MAMMALS																																
Gould's Wattled Bat	Chalinolobus gouldii																	X										X				
Gould's Wattled Bat / Little North-eastern Freetail Bat	C. gouldii / Mormopterus ridei																	▲														
Gould's Wattled Bat / Inland Broad-nosed Bat	C. gouldii / S. Balstoni																	▲														
Chocolate Wattled Bat	Chalinolobus morio																	X										X				
Little Pied Bat	Chalinolobus picatus		NT															X										▲				
	Nyctophilus sp.																	X														
	Scotorepens spp. / Chalinolobus nigrogriseus																	▲														
Inland Broad-nosed Bat	Scotorepens balstoni																	X										X				
Inland Broad-	S. balstoni / M. ridei																	▲														

Common Name	Scientific Name	EPBC Act Status	NC Act Status	LP Act Status	Aquatic species	Dry Season Aquatics														Wet Season Aquatics												
						TAS1	TAS2	TAS3	TAS4	TAS5	TAS6	TAS7	TAS8	TAS9	TAS10	TAS11	TAS12	Opps	AQ01	AQ02	AQ04	AQ05	AQ06	AQ07	AQ08	AQ09	AQ10	AQ11	AQ12	AQ13		
nosed Bat / Little North-eastern Freetail Bat																																
Northern Broad-nosed Bat	Scotorepens greyii																											X				
Little Broad-nosed Bat/ Northern Broad-nosed Bat	Scotorepens greyii / S. sanborni																		X													
Inland Forest Bat	Vespadelus baverstocki																		X									▲				
Inland Forest Bat / Bent-wing Bat	V. baverstocki / Miniopterus orianae oceanensis																		▲													
Little Forest Bat	V. vulturnus																											▲				
Northern Freetail Bat	Chaerephon jobensis																		X													
Beccari's Freetail Bat	Mormopterus beccarii																		X									X				
Little North-eastern Freetail Bat	Mormopterus ridei																											X				
Yellow-bellied Sheathtail Bat	Saccolaimus flaviventris																		X									X				
Troughton's Sheathtail Bat	Taphozous troughtoni																											▲				

Key:

NC Act	=	<i>Nature Conservation Act 1992</i>
EPBC Act	=	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
LP Act	=	<i>Land Protection (Pest and Stock Route Management) Act 2002</i>
Opps	=	Opportunistic observation
M	=	Migratory
Ma	=	Marine
LC	=	Least Concern
NT	=	Near Threatened
V	=	Vulnerable
E	=	Endangered
*	=	Introduced species
C1	=	Class 1 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>
C2	=	Class 2 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>
C3	=	Class 3 declared pest under the <i>Land Protection (Pest and Stock Route Management) Act 2002</i>
△	=	Calls not positively identified