

**Attachment 4 Roma Flood Study Environmental Assessment Report**





**Maranoa Regional Council**

Roma Flood Study  
Environment Assessment Report

October 2013

# Executive summary

The Bungil Creek catchment is a relatively small catchment upstream of Roma, covering an area of approximately 1400 km<sup>2</sup>. Bungil Creek is ephemeral and flows in a southerly direction and joins with the Balonne River which is part of the greater Murray-Darling system. The Bungil Creek catchment is within the Brigalow Belt Bioregion.

Following the flood events of 2010, 2011 and 2012, Maranoa Regional Council (MRC) has been assessing potential flood mitigation options for the township of Roma. The mitigation project has been divided into two (2) main stages. The Stage 2 mitigation options include diversion drains, detention areas and creek realignment.

The Study Area for the current assessment was defined as the Stage 2 Investigation Area for the flooding study, together with the upstream and downstream reaches of Bungil Creek. As a part of this environmental assessment, GHD performed the following activities:

- Desktop review of available information from sources such as Department of Environment and Heritage Protection (DEHP), MRC, and Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).
- Field investigation to ground truth the desktop information and evaluate the effects of modifications within Bungil Creek and associated waterways.
- Summarise any constraints or opportunities identified during the desktop and field investigation.
- Identify and list approvals that are likely to be triggered by work in the area.

No threatened or migratory species were recorded/confirmed present during the field survey in the Study Area. Two threatened species are considered likely to occur (koala and yakka skink) and twelve threatened or migratory species may occur within the Study Area.

Three threatened ecological communities (TECs), listed as endangered under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), that may occur in, or may relate to, the Study Area are:

- Weeping Myall Woodlands
- Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions
- Brigalow (*Acacia harpophylla* dominant and co-dominant)

No Coolibah-Black Box Woodland was observed within the Study Area or within the proposed levee alignment in the previous study (SKM 2013). The presence of 'Weeping Myall Woodlands' TEC was confirmed during the field survey in the Study Area. Mapping identifies the presence of the Brigalow TEC within the study area, noting however that this portion of the Study Area could not be ground-truthed during the field survey.

The field survey noted that the RE map produced by DEHP is broadly accurate for the Study Area. Specifically, the field survey confirmed that remnant RE 11.3.25 is present along the extent of Bungil Creek. RE 11.3.25 is described as *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines. This RE has a status of least concern pursuant to the *Vegetation Management Act 1999* (VM Act).

All native flora species that were recorded in the remnant vegetation communities were species that are least concern pursuant to the *Nature Conservation Act 1992* (NC Act). The remnant

vegetation was noted to support a diversity of fauna habitat features, such as tree hollows, rocky outcrops, fallen logs and leaf litter.

Bungil Creek is a highly disturbed watercourse with an extensively cleared catchment, a narrow riparian vegetation zone and cattle grazing. Bungil Creek upstream of Roma, had native rushes (*Juncus* sp.) present and limited erosion. There was tall, mature riparian vegetation present (including *Eucalyptus tereticornis* and *E. camaldulensis*); however, the width of the riparian vegetation was less than 20 m. There were abundant large snags and woody debris within the creek channel and trailing vegetation and undercut banks present, which provides a variety of habitat for aquatic fauna when water is present.

A number of pools were present upstream of Roma, which may provide refuge habitat and Bungil Creek upstream of Roma is likely to provide habitat value for fish when water is present.

Bungil Creek within Roma and downstream of Roma was more disturbed than Bungil Creek upstream of Roma. There is a narrower riparian zone, with a few tall, mature trees and limited native aquatic vegetation was present.

The water quality within Bungil Creek and Shadys Lagoon was poor, with surface scum and turbid water observed. Other disturbances included stormwater inputs, rubbish, road crossings and cattle access to Bungil Creek. Bungil Creek and Shadys Lagoon within Roma and Bungil Creek downstream of Roma may provide refuge habitat (pools) for fish.

Ecological values that were identified within the Study Area may be subject to two predominant impacts from the flood mitigation options, namely:

- direct removal as a result of levee construction or other earthworks;
- changes to the hydrological regime.

The presence of matters of national environmental significance within the Study Area represents the key environmental constraint to the Project. Although Weeping Myall Woodlands occur on alluvial floodplains, SEWPaC's listing advice for this matter of national environmental significance states that this community is restricted to flat areas, shallow depressions or gilgais on raised alluvial plains that are rarely if ever flooded (TSSC 2008). As such, any proposal to modify the current flooding regime of this community in terms of frequency and/or duration of inundation has the potential to impact this matter of national environmental significance. Similarly, Brigalow communities are unlikely to tolerate frequent or prolonged inundation.

Other matters of national environmental significance, namely threatened and migratory species, that are likely or may occur in the Study Area mainly rely on the remnant woodland (RE 11.3.25) within the riparian zone associated with Bungil Creek. Limiting disturbance and clearing of riparian vegetation along Bungil Creek will protect the suitable habitat that is available in the Study Area for threatened and migratory species.

The Stage 2 High Flow diversion channel and the High Western diversion drain have the potential to reduce the flushing of Bungil Creek between East Miscamble St and Creek St. The High Flow diversion channel is designed to divert > 10 year ARI event flow. A reduction in flushing of Bungil Creek may influence water quality and sedimentation in Bungil Creek.

Modelling of changes to the hydrological regime in the Study Area during a 10 year ARI event is required to determine impacts on Weeping Myall Woodlands, Brigalow communities, water quality and sedimentation.

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*The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.*

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

# 1. Introduction

## 1.1 Overview

The Bungil Creek catchment is a relatively small catchment upstream of Roma, covering an area of approximately 1400 km<sup>2</sup>. Bungil Creek is ephemeral and flows in a southerly direction and joins with the Balonne River which is part of the greater Murray-Darling system. The Bungil Creek catchment is within the Brigalow Belt Bioregion.

Average rainfall throughout the Bungil Creek catchment is 700 mm per annum. There is a high degree of variability in regards to seasonal rainfall, with the summer months dominating rainfall totals within the catchment.

Major flooding in the Bungil Creek is relatively infrequent. However, under certain meteorological conditions such as tropical low pressure systems, heavy rainfalls can occur throughout the catchment which can result in significant riverine flooding.

Following the flood events of 2010, 2011 and 2012, Maranoa Regional Council (MRC) has been assessing potential flood mitigation options for the township of Roma. Flood studies of the Bungil Creek catchment to ascertain flooding characteristics and investigate flood mitigation options are currently underway.

The mitigation project has been divided into two (2) main stages. Stage 1 incorporates a proposed levee that extends from the airport and continues south to finish near Lovell Street (approximately 4.6 km long). Stage 2 is defined as an investigation area downstream of Stage 1 that may consider options such as extensions to the Stage 1 levee, diversion drains, detention areas and creek realignment.

GHD anticipates that the following engineering options, either individually or in combination, will be considered during the Stage 2 options analysis:

- Three locations in the floodplain for proposed levees.
- Two locations for a high flow channel diversion.
- Two locations for detention.
- Warrego Highway embankment/culvert modifications.
- Variable flood gates at the location of the proposed levee.
- Influence of Bungil Creek, downstream of Warrego Highway.

## 1.2 Purpose of this report

GHD performed an environmental assessment for the Stage 2 investigation area and upstream and downstream reaches of Bungil Creek. As a part of this assessment, GHD performed the following activities:

- Desktop review of available information from sources such as Department of Environment and Heritage Protection (DEHP), MRC, and Department of Sustainability, Environment, Water, Population and Communities (SEWPaC).

- Field investigation to ground truth the desktop information and evaluate the effects of modifications within Bungil Creek and associates waterways.
- Summarise any constraints or opportunities identified during the desktop and field investigation.
- Identify and list approvals that are likely to be triggered by work in the area.

### **1.3 Limitations**

The ecological field survey was a snapshot assessment that targeted representative sites within the Study Area, and as such did not involve undertaking detailed ecological assessments or thoroughly traversing the Study Area. The ecological field survey was limited to publically accessible areas.

## 2. Relevant Legislation

### 2.1 Overview

Outlined below is an overview of the key regulatory instruments of relevance to the flood mitigation options for the township of Roma.

### 2.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth's principal piece of environmental protection legislation. It provides a national framework for the protection of the Australian environment and its unique biodiversity. Specifically, the EPBC Act aims to protect the environment by reducing significant impacts to matters of national environmental significance.

In addition to endowing protection on Australia's environment, the EPBC Act provides a systematic framework for assessment and approval of actions potentially affecting matters of national environmental significance. The matters of national environmental significance which the Project may potentially have a significant impact on include:

- Wetlands (Ramsar) (section 16 & 17B)
- Listed threatened species and communities (sections 18 & 18A)
- Listed migratory species (section 20 & 20A)

Changes to water quality, flood frequency and duration have the potential to affect the matters of national environmental significance listed as controlling provisions for the Project. The degradation of surface water quality, or the change in flood frequency or duration, could affect habitat for listed threatened species and habitat communities.

### 2.3 Queensland Legislation

#### 2.3.1 Queensland Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) provides for the conservation of nature through protection of all native plants and animals in Queensland. Protection is provided under the NC Act through conservation of land as protected areas and wildlife protection outside of protected areas. Actions impacting on protected native flora and fauna are regulated under the NC Act. Permits for disturbance to native flora and fauna can be administered under the NC Act. The *Queensland Nature Conservation (Wildlife) Regulation 2006* lists flora and fauna species considered to be extinct in the wild, endangered, vulnerable, near threatened and least concern in Queensland.

Under the *Nature Conservation Wildlife Regulation 2006*, any activity that will tamper with (i.e. remove, damage, impair or degrade) the confirmed breeding place of a native animal (i.e. endangered, vulnerable, near threatened and least concern wildlife) requires a Damage Mitigation Permit (DMP) or Species Management Programme (SMP) in order to be conducted legally.

Clearing of native plants is restricted pursuant to the *Nature Conservation (Protected Plants) Conservation Plan 2000*, which is subordinate to the NC Act, and may require an approved application for a 'Clearing Permit (Protected Plants)'.

### **2.3.2 Queensland Vegetation Management Act 1999**

The *Vegetation Management Act 1999* (VM Act) provides a framework for the regulation of woody, terrestrial native vegetation located outside of protected areas. The stated purpose of the VM Act is to regulate the clearing of native vegetation in a way that:

- Conserves remnant vegetation that is an endangered, of concern or least concern RE
- Conserves vegetation in declared areas
- Ensures clearing does not cause land degradation
- Prevents biodiversity loss
- Maintains ecological processes
- Manages the environmental effects of the clearing to ensure the above purposes are obtained
- Reduce greenhouse gas emissions

The VM Act provides for the establishment and mapping of Regional Ecosystems (REs) that encompass vegetation community descriptions within a geological and bioregional context, and for the creation and use of clearing codes (among other things). In addition, it provides a process for applying to change RE mapping and for the investigation and prosecution of clearing offences. Details on what clearing activities require assessment against the various regional clearing codes authorised under the VM Act are provided by the *Sustainable Planning Regulation 2009* (SP Regulation).

### **2.3.3 Queensland Sustainable Planning Act 2009**

The purpose of the *Sustainable Planning Act 2009* (SP Act) is to achieve ecological sustainability by:

- Managing the process by which development takes place, including ensuring that the process is accountable, effective and efficient and delivers sustainable outcomes
- Managing the effects of development on the environment
- Providing for the coordination and integration of planning at the local, regional and State levels

### **2.3.4 Queensland Environmental Protection Act 1994**

The *Environment Protection Act 1994* (EP Act) provides a regulatory framework for the protection and management of the Queensland environment. The objective of the EP Act is to protect Queensland's environment while allowing for development that is ecologically sustainable.

The environmental values of Queensland's waterways are protected under the EP Act and the *Environmental Protection (Water) Policy 2009*.

### **2.3.5 Queensland Environmental Protection (Water) Policy 2009**

The *Environmental Protection (Water) Policy 2009* (EPP (Water)) is subordinate legislation that supports the EP Act. The EPP (Water) provides environmental values (EVs) and water quality objectives (WQOs) for all Queensland waters. Environmental values are defined by the EPP (Water) as the qualities of waterways that need to be protected to ensure that the ecological, social and economic values and uses of the waterway are maintained.

### **2.3.6 Queensland Water Act 2000**

The *Water Act 2000* (Water Act) is jointly administered by the Department of Environment and Heritage Protection (DEHP), the Department of Natural Resources and Mines and the Department of Energy and Water Supply. It is the primary statutory document that establishes a system for water planning, allocation and use, and includes allocation of water resources for environmental purposes. The purpose of the Water Act is to advance sustainable management and efficient use of water and other resources. The Water Act provides for a number of activities including the measurement and management of water, construction, control and management of works for conservation and protection, irrigation and water supply, drainage, flood control and prevention, improvement of the flow in, or changes to watercourses, protection and improvement of the physical integrity of watercourses, lakes and springs.

Management of the water resources during construction and operation will need to be undertaken in accordance with the requirements of the Water Act.

### **2.3.7 Queensland Fisheries Act 1994**

The *Fisheries Act 1994* (Fisheries Act) is implemented by the state government, and provides for the management, use, development and protection of fisheries resources and fish habitats and the management of aquaculture activities. The Act's objective is to provide for the use, conservation and enhancement of the community's fisheries resources and fish habitats through the application of the principles of ecologically sustainable development.

The Fisheries Act provides legislative guidance with regard to the maintenance of fish movement through waterways. Under Section 112 of the *Fisheries Act 1994* a person must not build waterway barrier works without approval.

## 3. Methodology

### 3.1.1 Study Area

The Study Area for the current assessment was defined as the Stage 2 Investigation Area for the flooding study, together with the upstream and downstream reaches of Bungil Creek (Figure 1).

### 3.1.2 Desktop Assessment

The initial step of the ecology component of this study involved a desktop-based review of existing information so as to ascertain the ecological characteristics that are known for the Study Area. The desktop review considered all relevant available spatial information and species databases, as well as previous ecological work completed on behalf of MRC, detailed as follows.

- EPBC Act Protected Matters Search, which is an online database that is maintained by SEWPaC. The EPBC Act Protected Matters Search identifies matters of national environmental significance that may potentially occur within a defined boundary, primarily based on habitat modelling.
- Wildlife Online, which is an online database of confirmed species records with restricted geographic precision that is maintained by DEHP.
- The *Vegetation Management Act Regional Ecosystem and Remnant Map - Version 6.1*, as produced by DEHP. Regional Ecosystems are vegetation communities that are consistently associated with a specific combination of geology, landform and soil within a particular bioregion.
- The *Regrowth Vegetation Map - Version 2.1*, as produced by DEHP. The Regrowth Vegetation Map shows areas of mature regrowth that have not been cleared since 31 December 1989 and Regrowth Watercourses in priority catchments, identified on the map as High Value Regrowth.
- The *Essential Habitat Map - Version 3.1*, as produced by DEHP. Essential Habitat Maps are produced for flora and fauna species that are Endangered, Vulnerable or Near Threatened under the NC Act. Essential Habitat is compiled from a combination of species habitat models and/or buffered records of species presence.
- SKM (2013) Roma Flood Study EPBC Protected Matters – Ecology Survey. Version 2, 17 May 2013.

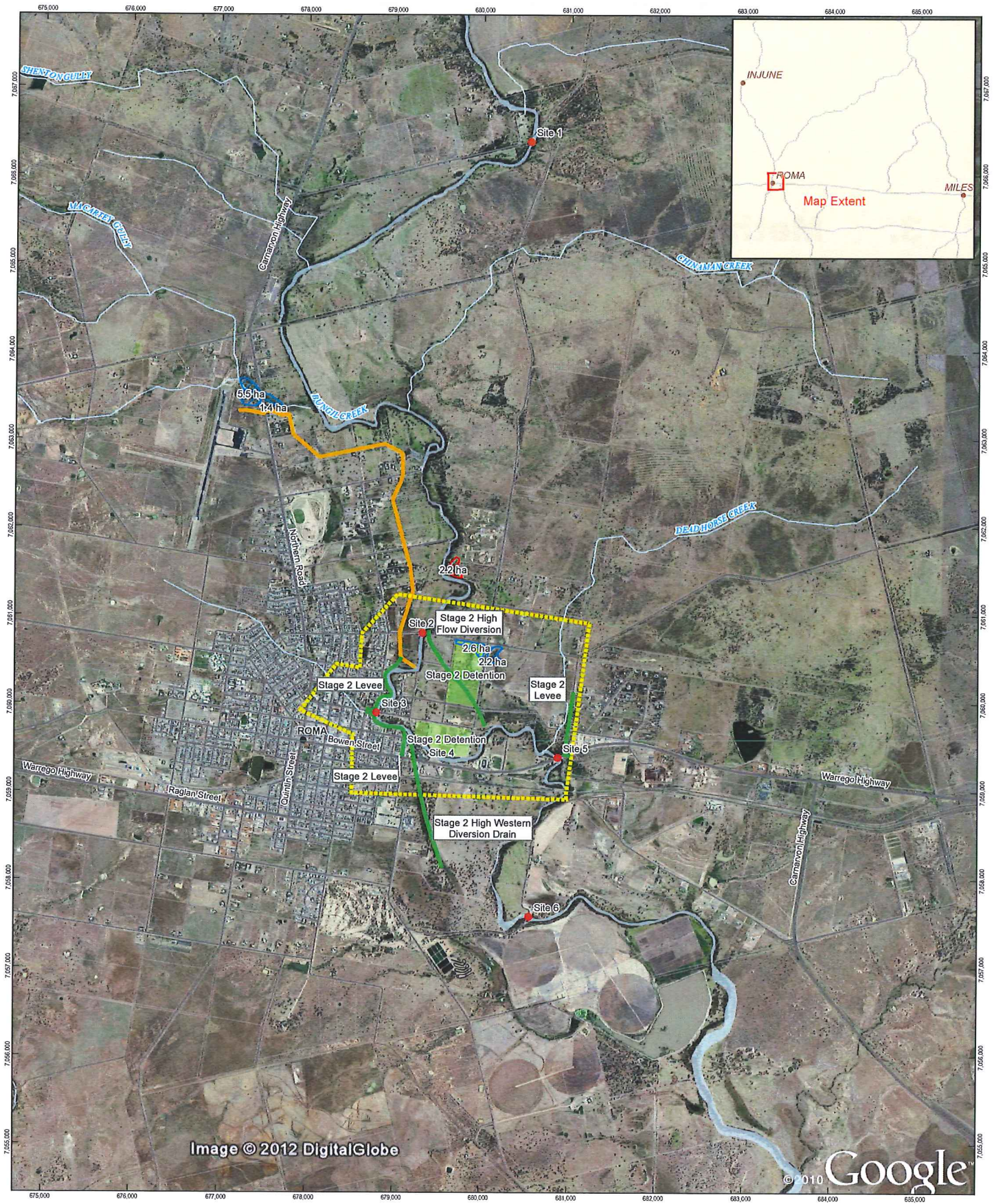


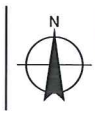
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- LEGEND**
- Assessment Sites
  - Populated Places
  - Watercourses
  - Highway
  - Road
  - GHD Stage 2 Levee
  - GHD Stage 1 Levee
  - Stage 2 Detention Area
  - TEC
  - ▨ Brigalow (not field verified)
  - ▨ Weeping Myall Woodland (indicative extent only)
  - ▨ Stage 2 Investigation Area
  - ▨ Stage 2 Detention Area
  - ▨ Cadastre
  - ▨ River

Based on or contains data provided by the State of QLD (DNRM) [2012]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

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 0 250 500 1,000  
 Metres  
 Map Projection: Universal Transverse Mercator  
 Horizontal Datum: GDA 1994  
 Grid: GDA 1994 MGA Zone 55



Maranoa Regional Council  
 Roma Flood Study

Job Number 41-25323  
 Revision A  
 Date 09 Oct 2013

Study Area and Site Locations

Figure 1

### **3.1.3 Field Assessment**

Based on existing vegetation mapping and recent aerial imagery, targeted sites for the field survey were selected and subsequently assessed. The locations of assessment sites are identified on Figure 1, noting that vehicular traverses of publically accessible roads were also undertaken within the surrounding landscape.

The terrestrial ecological survey was undertaken in accordance with the quaternary level of assessment as described by Neldner *et al.* (2012) in the Queensland Herbarium's *Methodology for Survey and Mapping of Regional Ecosystems and Vegetation Communities in Queensland*. Quaternary level assessments involve recording attributes such as the land zone (geology) present, together with the dominant flora species composition, height and cover of each strata comprising the existing vegetation community. A qualitative terrestrial fauna habitat assessment was also undertaken and involved searches for fauna habitat features.

Aquatic ecology assessments were undertaken at Bungil Creek and water bodies within the Study Area. The aquatic ecology assessment included the following:

- substrate type and composition;
- surface water depth;
- type and availability of habitat structure (*e.g.* woody debris);
- riparian zone characteristics;
- observations of aquatic fauna;
- pest flora and fauna;
- habitat attributes (*e.g.* macrophytes, substrate anoxia, trailing bank vegetation);
- odour and turbidity;
- deposition, scouring and erosion; and
- existing disturbances.

The findings of the aquatic ecology assessment were used to describe the aquatic ecology values of Bungil Creek and other waterbodies within the Study Area.

### **3.1.4 Likelihood of Occurrence Assessment**

The information acquired through the desktop and field assessments described above was used to characterise the existing terrestrial and aquatic ecological values of the Study Area. For conservation significant flora and fauna species, a likelihood of occurrence assessment was undertaken to inform the impact identification process. This assessment considered information relating to:

- Habitat preferences
- Distribution
- Relative abundance
- Previous records (Wildlife Online) from the Study Area and MRC

- The occurrence of suitable habitat at the Study Area based on field observations
- The confirmed presence of conservation significant species at the Study Area

A likelihood of occurrence ranking was attributed to each conservation significant species, based on the following framework:

- **Unlikely to occur:** species has not been recorded in the region (no records from desktop searches) **AND/OR** current known distribution does not encompass Study Area **AND/OR** suitable habitat is generally lacking from the Study Area.
- **May occur:** species has not been recorded in the region (desktop searches) although species' distribution incorporates Study Area **AND** potentially suitable habitat occurs at the Study Area.
- **Likely to occur:** species has been recorded in the region (desktop searches) and suitable habitat is present at the Study Area
- **Confirmed present:** species recorded during field surveys at the Study Area

## 4. Results / Ecological Values

### 4.1 Matters of National Environmental Significance

#### 4.1.1 Overview

The EPBC Act Protected Matters Search, conducted on 4 June 2013 of the Study Area, identified one Ramsar wetland, two Threatened Ecological Communities (TECs), 12 threatened fauna species and nine migratory birds as potentially relating to the search area. The EPBC Protected Matters Search is included in Appendix A and the Wildlife Online records for the threatened migratory species observed in the Maranoa Regional Council and Study Areas is included in Appendix B.

#### 4.1.2 Wetlands of International Importance (Ramsar)

Narran Lake Nature Reserve was identified in the EPBC Act Protected Matters Search as occurring 500 km downstream of Bungil Creek at Roma. The previous study (SKM, 2013) found that the construction of the levee will not have an impact on this wetland due to the distance between the proposed works and the wetland and because the levee will not alter the volume of water flowing in Bungil Creek. The Stage 2 flood mitigation options will also be designed so that the volume of water flowing in Bungil Creek south of Roma is not altered and, therefore, the Narran Lake Nature Reserve will not be affected by the proposed options.

#### 4.1.3 Threatened and Migratory Species

The EPBC Act Protected Matters Search identified the potential presence of four birds, four mammals, three reptiles and one fish species with threatened (endangered or vulnerable) status, and nine migratory species within the Study Area. The threatened and migratory species identified by the search are listed in Table 1.

Australia is party to international conventions and agreements to protect many migratory species, including:

- Japan-Australia Migratory Bird Agreement (JAMBA)
- China-Australia Migratory Bird Agreement (CAMBA)
- Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA)
- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention)

Species that are listed under the JAMBA, CAMBA, ROKAMBA and Bonn Conventions are also identified in Table 1.

The likelihood of occurrence of these species in the Study Area was assessed based on each species' preferred habitat and the habitat types available in that area. Likelihood of occurrence of each species is outlined in Table 1.

No threatened or migratory species were recorded/confirmed present during the field survey. Two threatened species are considered likely to occur (koala and yakka skink) and twelve threatened or migratory species may occur within the Study Area.

**Table 1 Likelihood of occurrence of threatened and migratory species**

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<b>Birds</b>				
<i>Erythrotriorchis radiates</i>	Red Goshawk	Vulnerable	The red goshawk prefers landscapes containing a mosaic of habitats including coastal and sub-coastal tall open forest, woodland and rainforest edges (Marchant and Higgins, 1993). Forests of intermediate density are particularly favoured (SEWPaC, 2013a). Nesting occurs in tall trees within one km of permanent water, generally in open, biologically-rich forest or woodland (Marchant and Higgins, 1993).	Species has not been recorded in the Study Area Potentially suitable habitat is present within woodland areas along Bungil Creek <b>May occur</b>
<i>Geophaps scripta scripta</i>	Squatter Pigeon (southern)	Vulnerable	The species occurs in a wide range of habitats wherever there is a grassy understorey. It is often found within close proximity of water bodies (SEWPaC, 2013b).	Species previously recorded in Wildlife online for the Maranoa Regional Council Area Suitable habitat is present within the Study Area along Bungil Creek <b>May occur</b>
<i>Neochmia ruficauda ruficauda</i>	Star Finch (eastern and southern)	Endangered	The distribution of the subspecies of the star finch is poorly known (SEWPaC, 2013c). The subspecies has disappeared from much of its former eastern and central Queensland range, with scattered records from the 1990s considered likely to be aviary escapes (Higgins <i>et al.</i> , 2006). Habitat preferences include grasslands and grassy woodlands near water, sedgelands, swamps and wetlands (Higgins <i>et al.</i> , 2006; SEWPaC, 2013c). The subspecies is also known from disturbed habitats including farmland (Higgins <i>et al.</i> , 2006; SEWPaC, 2013c).	Species previously recorded in Wildlife online for the Maranoa Regional Council Area Potentially suitable habitat occurs within Study Area along Bungil Creek <b>May occur</b>

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<i>Rostratula australis</i>	Australian Painted Snipe	Endangered and Migratory	The Australian painted snipe has a scattered distribution across eastern and northern Australia (SEWPaC, 2013d). Shallow freshwater wetlands are the main habitat for the Australian painted snipe (Marchant and Higgins, 1993). Such wetlands may include lakes, swamps, claypans, inundated / waterlogged grassland, dams, irrigated crop land and sewage ponds (Marchant and Higgins, 1993). Preferred wetland habitats boast emergent vegetation (including tussocks, grasses, sedges, rushes, reeds, canegrass and/or Melaleuca) (Marchant and Higgins, 1993). Nesting occurs amongst vegetation in or adjacent to wetlands (SEWPaC, 2013d).	Species has been recorded in Wildlife online for the Study Area and Maranoa Regional Council Area Potentially suitable habitat (permanent wetlands) are limited within Study Area <b>May occur</b>
<b>Mammals</b>				
<i>Chalinolobus dwyeri</i>	Large-eared Pied Bat, Large Pied Bat	Vulnerable	Roosts in caves, crevices in cliffs and mines, generally in dry sclerophyll forests and woodlands as well as higher altitude moist rainforest and eucalypt forest (SEWPaC, 2013e).	Species previously recorded in in Wildlife online for the Maranoa Regional Council Area Potentially suitable habitat is not present in the Study Area. <b>Unlikely to occur</b>
<i>Dasyurus hallucatus</i>	Northern Quoll	Endangered	The current range of the northern quoll has contracted considerably such that it is now thought to be restricted to six discrete areas across northern Australia (Strahan, 1995). While the species does not have highly specific habitat requirements, rocky areas associated with open woodland and open forest are considered optimal habitat for the northern quoll (Hill and Ward, 2010).	Species has been recorded in Wildlife online for Maranoa Regional Council Area Potentially suitable habitat is not present in the Study Area <b>Unlikely to occur</b>
<i>Nyctophilus corbeni</i>	South-eastern Long-eared Bat	Vulnerable	The greater long-eared bat generally inhabits woodland vegetation, including box and ironbark woodlands in arid and semi-arid inland areas (Strahan, 1995). It is typically known from south-east Australia (especially the Murray-Darling Basin) (Strahan, 1995).	Species previously recorded in in Wildlife online for the Maranoa Regional Council Area Suitable habitat is present along Bungil Creek within the Study Area <b>May occur</b>

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<i>Phascolarctos cinereus</i>	Koala	Vulnerable	In Queensland, the species contains scattered populations throughout eucalypt woodlands along watercourses within semi-arid areas further west (Melzer <i>et al.</i> 2000). The greatest density of koalas occurs in south-east Queensland, with lower densities occurring through central and eastern areas including the Brigalow Belt (Patterson 1996).	Sighting recorded in Wildlife online for the Study Area and Maranoa Regional Council Area. SKM (2013) reported old scratch marks on some eucalypts. Suitable habitat occurs within the mature riparian woodland fringing Bungil Creek <b>Likely to occur</b>
<b>Reptiles</b>				
<i>Delma torquate</i>	Collared Delma	Vulnerable	The collared delma normally inhabits eucalypt-dominated woodlands and open-forests, with rocks, logs, bark and other coarse woody debris, and mats of leaf litter (typically 30–100 mm thick) present (SEWPaC, 2013f).	Species previously recorded in in Wildlife online for the Maranoa Regional Council Area Possible, suitable habitat exists within woodland areas along Bungil Creek <b>May occur</b>
<i>Egernia rugosa</i>	Yakka Skink	Vulnerable	The yakka skink is endemic to dry open forests, woodlands and rocky areas of central and eastern Queensland. Yakka skinks live in communal burrow complexes, and often take refuge among low vegetation or under heaped dead timber, logs, rocks and in deep rock crevices (Wilson 2005; SEWPaC, 2013g).	Sighting recorded in Wildlife online for the Study Area and Maranoa Regional Council Area Potentially suitable habitat occurs within woodland areas along Bungil Creek <b>Likely to occur</b>

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<i>Furina dunmalli</i>	Dunmall's Snake	Vulnerable	The ornamental snake's distribution is confined to the brigalow belt bioregion. This species is typically found in areas of brigalow, riverside woodland and open forest on natural levees (SEWPaC, 2013h). Habitats featuring cracking clay and sandy substrates are known to be utilised by the species.	Species previously recorded in in Wildlife online for the Maranoa Regional Council Area Potentially suitable habitat occurs within woodland areas along Bungil Creek <b>May occur</b>
<b>Fish</b>				
<i>Maccullochella peelii</i>	Murray Cod	Vulnerable	The Murray cod has the ability to live in a diverse range of habitats, including clear rocky streams to slow flowing, turbid rivers and billabongs within the Murray-Darling Basin. Generally, they are found in waters up to 5 m deep and in areas with complex structural cover including rocks, snags, woody debris or overhanging banks (SEWPaC, 2013i). The Murray cod is frequently found in the main river channel and larger tributaries. It is found in floodplain channels when they contain water, although this usage appears limited (SEWPaC, 2013j).	Species distribution incorporates Study Area Possible within Bungil Creek during times of moderate to high flow. <b>May occur</b>
<b>Migratory</b>				
<i>Apus pacificus</i>	Fork-tailed Swift	migratory (CAMBA, JAMBA, ROKAMBA), marine	Habitat preferences include open country from semi-deserts to coasts. Common and widespread across Australia (Pizzezy and Knight, 2007).	Species distribution incorporates Study Area Suitable habitat occurs at Study Area <b>May occur</b>
<i>Ardea alba</i>	Great Egret, White Egret	migratory (CAMBA, JAMBA, ROKAMBA), marine	Inhabits shallows of rivers, estuaries, tidal mudflats, freshwater wetlands, sewage ponds, irrigation areas and larger dams. This species is widespread throughout Australia (Pizzezy and Knight, 2007).	Species distribution incorporates Study Area The preferred permanent wetland habitat is limited within the Study Area <b>May occur</b>

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<i>Ardea ibis</i>	Cattle Egret	migratory (CAMBA, JAMBA), marine	Occurs in stock paddocks, croplands, wetlands, tidal mudflats and drains. Widespread distribution in northern and eastern Australia, summer-Autumn migrant to Queensland (Pizzey and Knight, 2007).	Species distribution incorporates Study Area Suitable habitat occurs at Study Area <b>May occur</b>
<i>Gallinago hardwickii</i>	Latham's Snipe, Japanese Snipe	migratory (Bonn; CAMBA; JAMBA; ROKAMBA), marine	Habitat preferences include soft wet ground or shallow water with tussocks and other green or dead growth, wet parts of paddocks or near dams, scrub or open woodland (Pizzey and Knight, 2007).	Species distribution incorporates Study Area The preferred permanent wetland habitat is limited within the Study Area <b>Unlikely to occur</b>
<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	migratory (CAMBA), marine	Found in coastal habitats and around terrestrial wetlands, especially along larger inland rivers and freshwater swamps and lakes (Pizzey and Knight, 2007).	Species distribution incorporates Study Area Limited potentially suitable habitat (larger permanent waterbody) occurs within the Study Area <b>Unlikely to occur</b>
<i>Merops ornatus</i>	Rainbow Bee-eater	migratory (JAMBA), marine	Occurs mainly in open forests and woodlands, shrublands and in various cleared or semicleared habitats including farmland with sandy, loamy soil. Usually occurs in open, cleared or lightly-timbered areas sometimes in close proximity to permanent water. Nests in burrows/tunnels created in creek banks, rivers, dams, in roadside cuttings, in the walls of gravel pits or quarries, in mounds of gravel, or in cliff-faces. Common and widespread distribution (Pizzey and Knight, 2007).	Species distribution incorporates Study Area Potentially suitable habitat for breeding occurs along the banks of Bungil Creek <b>May occur</b>

Species Name	Common Name	EPBC Act Status	Preferred Habitat	Likelihood of Occurrence
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	migratory (Bonn), marine	Inhabit heavily vegetated gullies in eucalypt dominated forests and taller woodlands (Pizzey and Knight, 2007).	Species distribution incorporates Study Area The preferred heavily vegetated habitat does not occur in the Study Area <b>Unlikely to occur</b>
<i>Rhipidura rufifrons</i>	Rufous Fantail	migratory (Bonn), marine	In east and south-east Australia, the rufous fantail mainly inhabits wet sclerophyll forests, often in gullies dominated by eucalypts with a dense shrubby understorey often including ferns. When on passage, they are sometimes recorded in drier sclerophyll forests and woodlands often with a shrubby or heath understorey. (Higgins et al. 2006).	Species distribution incorporates Study Area The preferred dense understorey habitat does not occur in the Study Area <b>Unlikely to occur</b>

#### 4.1.4 Threatened Ecological Communities

Three TECs, listed as endangered under EPBC Act, that may occur in, or may relate to, the Study Area are:

- Weeping Myall Woodlands
- Coolibah-Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions
- Brigalow (*Acacia harpophylla* dominant and co-dominant)

No Coolibah-Black Box Woodland was observed within the present Study Area or within the proposed levee alignment in the previous study (SKM 2013).

##### *Weeping Myall Woodlands*

The presence of one TEC was confirmed during the field survey, namely, 'Weeping Myall Woodlands' that is listed as endangered pursuant to the EPBC Act. The indicative locations of the Weeping Myall Woodlands identified during the field survey are presented in Figure 1, noting however that the field survey was restricted to publically accessible land and, as such, the precise extent of these vegetation communities could not be accurately mapped. Although a detailed floristic assessment could not be undertaken, observations recorded during the field survey (Plate 1) noted that the vegetation community appears to meet the TEC criteria, detailed as follows.

- The tree canopy is dominated (at least 50% of trees present) by living, dead or defoliated *Acacia pendula* trees; and
- The overstorey must have at least 5% tree canopy cover or at least 25 dead or defoliated mature *Acacia pendula* trees per hectare; and
- The area is at least 0.5 ha in size; and
- The patch has either (i) more than two layers of regeneration of *Acacia pendula* present or (ii) the tallest layer of living, dead or defoliated *Acacia pendula* trees is at least 4 m tall and of the vegetation cover present, 50% is comprised of native species.



**Plate 1**      **Weeping Myall Woodland**

### **Brigalow**

The potential presence of a third TEC was identified during the desktop review, namely 'Brigalow (*Acacia harpophylla* dominant and co-dominant)'. The area in which this community is potentially located is in the Study Area, to the north of Roma, but outside the 'Stage 2 Investigation Area' (refer Figure 1). This area was not accessible during the field survey, such that the presence of this community could not be confirmed.

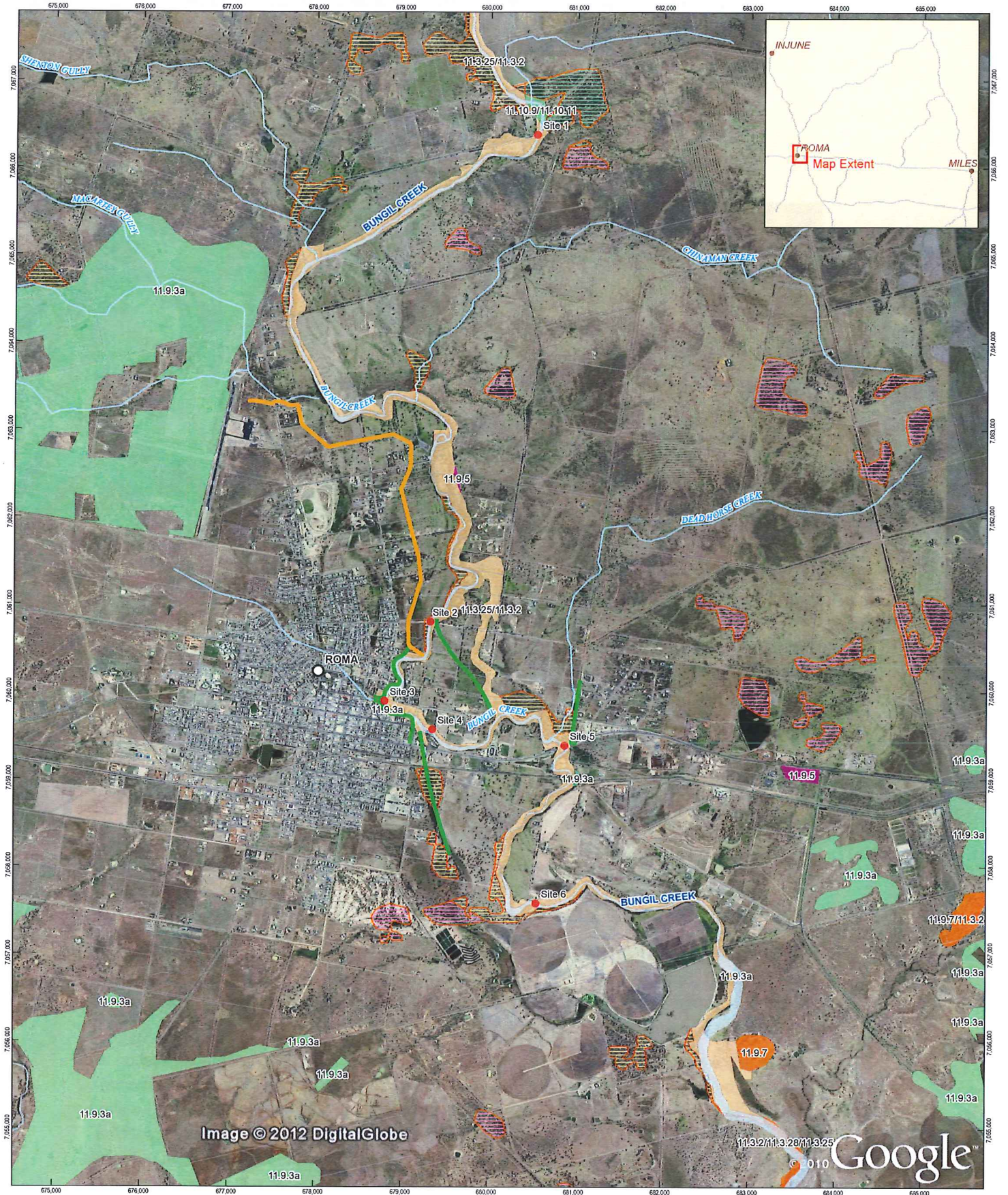
## **4.2 State-protected values**

### **4.2.1 Remnant vegetation**

The field survey noted that the RE map produced by DEHP is broadly accurate for the Study Area (refer Figure 2). Specifically, the field survey confirmed that remnant RE 11.3.25 is present along the extent of Bungil Creek (Plate 2 and Plate 3). RE 11.3.25 is described as *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.

This RE has a status of least concern pursuant to the VM Act. The canopy of the vegetation was dominated by large mature *Eucalyptus tereticornis* and *E. camaldulensis* individuals that were generally 14 to 18 m in height, with *Casuarina cunninghamiana* occasionally present. The shrub layer was generally 8 m in height and comprised of *Melaleuca trichostachya* or *Acacia salicina*. The groundlayer was typically composed of a diversity of exotic grasses and herbaceous weeds, such as *\*Cynodon dactylon*, *\*Megathyrsus maximus*, *\*Verbena bonariensis*, *\*Solanum nigrum*, *\*Argemone mexicana* and *\*Xanthium pungens*. Native ground layer species were notably sparse and included *Juncus* sp. and *Wahlenbergia* sp.

All native flora species that were recorded in the remnant vegetation communities were species that are least concern pursuant to the NC Act. The remnant vegetation was noted to support a diversity of fauna habitat features, such as tree hollows, rocky outcrops, fallen logs and leaf litter.



- LEGEND**
- Town
  - Assessment Sites
  - GHD Stage 2 Levee
  - GHD Stage 1 Levee
  - Watercourses
  - Cadastre
  - River
  - High Value Regrowth
  - Containing Endangered Regional Ecosystems
  - Containing Of Concern Regional Ecosystems
  - Containing Least Concern Regional Ecosystems

- Remnant Vegetation**
- Endangered (Dominant)
  - Endangered (Sub-dominant)
  - Of Concern (Dominant)
  - Of Concern (Sub-dominant)
  - Least Concern

Based on or contains data provided by the State of QLD (DNRM) [2012]. In consideration of the State permitting use of this data you acknowledge and agree that the State gives no warranty in relation to the data (including accuracy, reliability, completeness, currency or suitability) and accepts no liability (including without limitation, liability in negligence) for any loss, damage or costs (including consequential damage) relating to any use of the data. Data must not be used for marketing or be used in breach of the privacy laws.

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



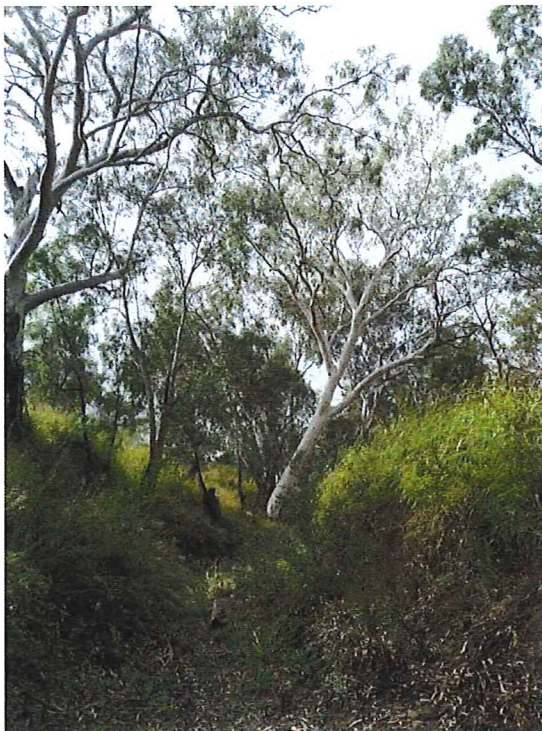
Maranoa Regional Council  
 Roma Flood Study Review and Scoping  
**Regional Ecosystems and High Value Regrowth**

Job Number | 41-25323  
 Revision | A  
 Date | 09 Oct 2013

**Figure 2**



**Plate 2 Remnant RE 11.3.25 Vegetation at Site 5**



**Plate 3 Remnant RE 11.3.25 Vegetation at Site 2**

#### 4.2.1 High Value Regrowth vegetation

In accordance with the *Regrowth Vegetation Map*, scattered patches of High Value Regrowth vegetation were observed in the Study Area, including High Value Regrowth communities containing endangered and of concern REs. Figure 2 identifies the locations of High Value Regrowth within the Study Area as identified by DEHP's mapping, noting that not all areas could be ground-truthed during the field survey.

A representative photograph of a High Value Regrowth community within the Study Area is provided as Plate 4 below. This vegetation community was an advanced stage of regrowth, and the composition was analogous to RE 11.3.2 that has an of concern status pursuant to the VM Act. The canopy of this vegetation community was comprised of *Eucalyptus populnea*, and the shrub layer was dominated by *Acacia salicina*. The groundlayer was dominated by exotic grasses.

All native flora species that were recorded in the High Value Regrowth communities were species that are least concern pursuant to the NC Act.

Specific fauna habitat features that were observed in the High Value Regrowth communities included woody debris. This ranged in size from small (<10 cm diameter) sticks, which were prevalent, through to larger logs.



**Plate 4 High Value Regrowth vegetation containing RE 11.3.2**

#### 4.3 Aquatic habitats

Bungil Creek is a highly disturbed watercourse with an extensively cleared catchment, a narrow riparian vegetation zone and cattle grazing. A summary of the aquatic habitat values at each site assessed is in Table 2.

Bungil Creek upstream of Roma (Site 1 and 2 Figure 1) has a primarily sandy substrate with some cobbles present. There were some native rushes (*Juncus* sp.) present (Plate 5) and limited

erosion. There was tall, mature riparian vegetation present (including *Eucalyptus tereticornis* and *E. camaldulensis*); however, the width of the riparian vegetation was less than 20 m. There were abundant large snags and woody debris within the creek channel and trailing vegetation and undercut banks present (Plate 6), which provides a variety of habitat for aquatic fauna when water is present.

There were exotic grasses and herbaceous weeds present in the riparian zone and the stream bed. Small pools were present at the time of the assessment, which were approximately 2 m wide, 10 m in length and < 1 m deep. There were potentially fish within these pools, with debris movement and sediment disturbance observed (Plate 7).

The pools may provide refuge habitat and Bungil Creek upstream of Roma is likely to provide habitat value for fish when water is present.



**Plate 5** Bungil Creek downstream of East Miscamble St crossing, with rushes in the stream bed (Site 2)



**Plate 6 Undercut banks and tree roots, Bungil Creek upstream of Roma (Site 2)**



**Plate 7 Pool in Bungil Creek upstream of Roma (Site 2)**

Bungil Creek within Roma (Site 3) and downstream of Roma (Sites 4, 5 and 6) (Figure 1) was more disturbed than Bungil Creek upstream of Roma.

There is a narrower riparian zone, with a few tall, mature trees (including *Casuarina cunninghamiana*, *Eucalyptus tereticornis* and *E. camaldulensis*). Limited native aquatic vegetation was present, including rushes (*Juncus* sp.), *Persicaria* sp. and reeds (*Phragmites australis*).

Extensive exotic grasses and herbaceous weeds (*Ruellia simplex*) on banks of Bungil Creek were observed (Plate 8). Undercut banks and extensive trailing vegetation was present at most sites and large snags and woody debris was present at Sites 4 and 5. Erosion was observed with banks undercut and bank stabilisation works in places (Plate 9).



**Plate 8** Herbaceous weeds (*Ruellia simplex*) on the bank on Bungil Creek at Site 4.



**Plate 9** Erosion at Shadys Lagoon (Site 3a left) and Bungil Creek (Site 3c right)

The water quality within Bungil Creek and Shadys Lagoon was poor, with surface scum and turbid water observed (Plate 10). Other disturbances included stormwater inputs, rubbish (Plate 11), road crossings and cattle access to Bungil Creek (Plate 12). Bungil Creek and Shadys Lagoon within Roma and Bungil Creek downstream of Roma may provide refuge habitat (pools) for fish.



**Plate 10 Surface scum, Bungil Creek Site 3c**

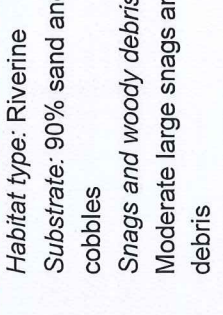
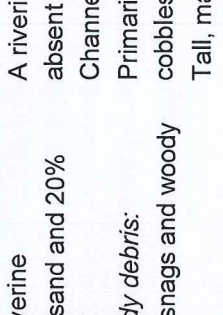


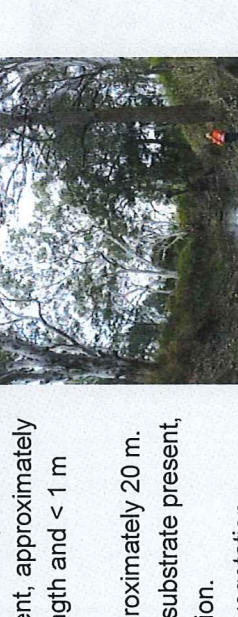
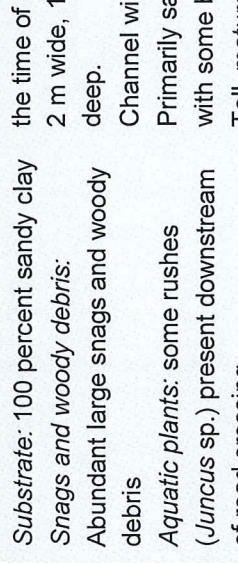
**Plate 11 Rubbish, Bungil Creek Site 5**

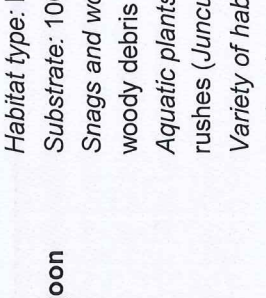
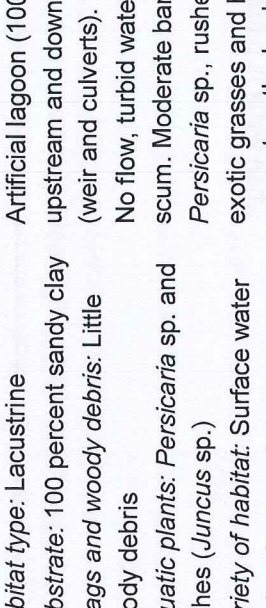



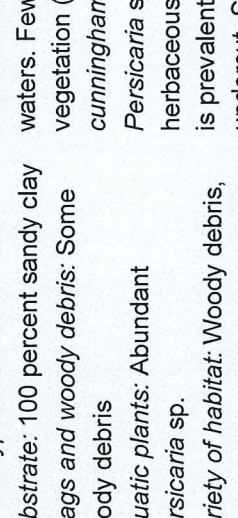
**Plate 12 Crossing and cattle disturbance, Bungil Creek Site 6**


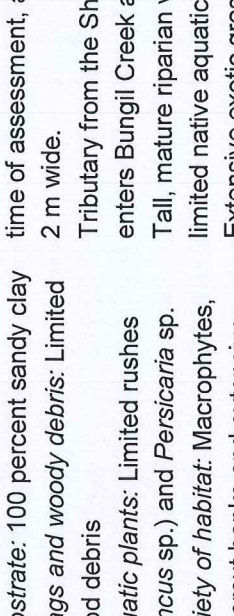
**Table 2 Summary of Aquatic habitats in the Study Area**


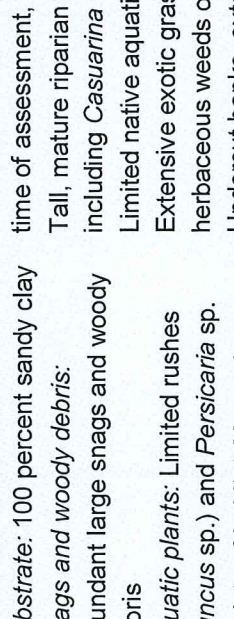
Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p>1 Bungil Creek at Burtons Rd</p>	<p><i>Habitat type:</i> Riverine <i>Substrate:</i> 90% sand and 20% cobbles <i>Snags and woody debris:</i> Moderate large snags and woody debris <i>Aquatic plants:</i> some rushes (<i>Juncus</i> sp.) present <i>Variety of habitat:</i> Surface water absent, woody debris, macrophytes and cobbles present <i>Aquatic fauna:</i> none observed <i>Disturbance:</i> Limited bank erosion</p>	<p>A riverine habitat with surface water absent at time of assessment. Channel width is approximately 20 m. Primarily sandy substrate with some cobbles present. Tall, mature riparian vegetation. Rushes and grasses on banks, with limited erosion. Exotic grasses and herbaceous weeds present in the stream bed. Site likely to be of value for fish when water is present.</p>	 <p>Downstream</p>  <p>Cobble substrate</p>

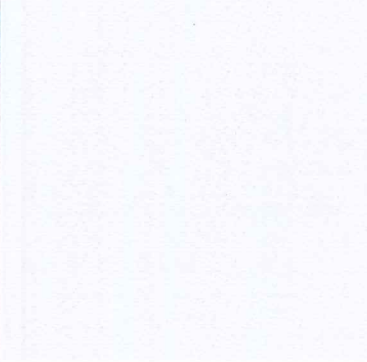
Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
2 <b>Bungil Creek at East Miscamble St</b>	<p><i>Habitat type:</i> Riverine</p> <p><i>Substrate:</i> 100 percent sandy clay</p> <p><i>Snags and woody debris:</i> Abundant large snags and woody debris</p> <p><i>Aquatic plants:</i> some rushes (<i>Juncus</i> sp.) present downstream of road crossing</p> <p><i>Variety of habitat:</i> Small pools, woody debris, macrophytes, trailing vegetation and undercut banks present</p> <p><i>Aquatic fauna:</i> potentially fish, with debris movement and sediment disturbance observed in the upstream pool</p> <p><i>Disturbance:</i> Some bank erosion</p>	<p>A riverine habitat with small pools at the time of assessment, approximately 2 m wide, 10 m in length and &lt; 1 m deep.</p> <p>Channel width is approximately 20 m.</p> <p>Primarily sandy clay substrate present, with some bank erosion.</p> <p>Tall, mature riparian vegetation.</p> <p>Rushes and grasses on banks, overhanging roots when water is present. Exotic grasses and herbaceous weeds present in the stream bed.</p> <p>Algae was observed on substrate and in the water column with a green tinge to the water.</p> <p>Site may provide refuge habitat (pools) and likely to provide value for fish when water is present.</p>	 <p>Upstream, wood debris in foreground</p>  <p>Upstream pool</p>

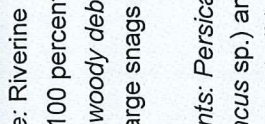
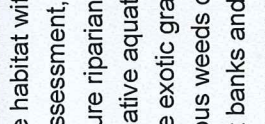
Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p><b>3a</b> <b>Shadys Lagoon</b></p>	<p><i>Habitat type:</i> Lacustrine  <i>Substrate:</i> 100 percent sandy clay  <i>Snags and woody debris:</i> Little woody debris  <i>Aquatic plants:</i> <i>Persicaria</i> sp. and rushes (<i>Juncus</i> sp.)  <i>Variety of habitat:</i> Surface water pool and macrophytes present  <i>Aquatic fauna:</i> potentially fish, with sediment disturbance observed  <i>Disturbance:</i> Artificial waterbody, stormwater drain inputs, erosion, rubbish</p>	<p>Artificial lagoon (100 m in length), with upstream and downstream barriers (weir and culverts).  No flow, turbid water with surface scum. Moderate bank erosion.  <i>Persicaria</i> sp., rushes (<i>Juncus</i> sp.), exotic grasses and herbaceous weeds present on the bank of the lagoon.  Site may provide refuge habitat (pools) and value for fish.  Approximately 20 ducks were observed on the bank.</p>	 <p>Upstream</p>  <p>Downstream</p>


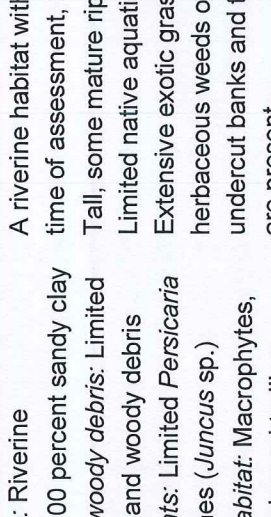
Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
3b			
<b>Tributary of Bungil Creek from Shadys Lagoon</b>	<p><i>Habitat type:</i> Riverine</p> <p><i>Substrate:</i> 100 percent sandy clay</p> <p><i>Snags and woody debris:</i> Some woody debris</p> <p><i>Aquatic plants:</i> Abundant</p> <p><i>Persicaria sp.</i></p> <p><i>Variety of habitat:</i> Woody debris, macrophytes, trailing vegetation and undercut banks present</p> <p><i>Aquatic fauna:</i> none observed</p> <p><i>Disturbance:</i> Culvert from Shadys Lagoon, bank stabilisation works</p>	<p>A riverine habitat with flowing surface waters. Few tall, mature riparian vegetation (<i>Casuarina cunninghamiana</i>), <i>Persicaria</i> sp., exotic grasses and herbaceous weeds on banks. Erosion is prevalent in reach, banks are undercut. Surface water moderately turbid.</p> <p>Tributary joins Shadys Lagoon with Bungil Creek. Site likely to provide value for fish, particularly as a refuge during dry periods.</p> <p>Egret observed.</p>	 <p>Downstream of Shadys Lagoon</p>  <p>Upstream</p>

Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p><b>3c</b> <b>Bungil Creek at tributary</b></p>	<p><i>Habitat type:</i> Riverine  <i>Substrate:</i> 100 percent sandy clay  <i>Snags and woody debris:</i> Limited wood debris  <i>Aquatic plants:</i> Limited rushes (<i>Juncus</i> sp.) and <i>Persicaria</i> sp.  <i>Variety of habitat:</i> Macrophytes, undercut banks and extensive trailing vegetation present  <i>Aquatic fauna:</i> none observed  <i>Disturbance:</i> bank erosion observed</p>	<p>A riverine habitat with low flow at the time of assessment, approximately 2 m wide.  Tributary from the Shady Lagoon enters Bungil Creek at this site.  Tall, mature riparian vegetation and limited native aquatic vegetation.  Extensive exotic grasses and herbaceous weeds on banks.  Overhanging banks and extensive trailing vegetation are present.  Slight odour, green scum and turbid water.  Site may provide refuge habitat and value for fish.</p>	 <p>Upstream</p>  <p>Downstream</p>

Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p><b>4</b> <b>Bungil Creek at Riggers Rd Park</b></p>	<p><i>Habitat type:</i> Riverine  <i>Substrate:</i> 100 percent sandy clay  <i>Snags and woody debris:</i>            Abundant large snags and woody debris  <i>Aquatic plants:</i> Limited rushes (<i>Juncus</i> sp.) and <i>Persicaria</i> sp.  <i>Variety of habitat:</i> Macrophytes, undercut banks and extensive trailing vegetation, large snags and woody debris present  <i>Aquatic fauna:</i> none observed  <i>Disturbance:</i> rubbish</p>	<p>A riverine habitat with low flow at the time of assessment, up to 4 m wide. Tall, mature riparian vegetation, including <i>Casuarina cunninghamiana</i>. Limited native aquatic vegetation. Extensive exotic grasses and herbaceous weeds on banks. Undercut banks, extensive trailing vegetation, large snags and woody debris are present. Surface scum and turbid water. Site may provide refuge habitat and value for fish. Ducks were observed higher up on the bank and a number of wrens and finches were observed close to the water's edge.</p>	 <p style="text-align: center;"><i>Upstream</i></p>  <p style="text-align: center;"><i>Downstream</i></p>

Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
			 <p data-bbox="686 1668 726 2027"><i>Woody debris in Bungil Creek</i></p>

Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p>5 Bungil Creek at Ewan Bridge</p>	<p><i>Habitat type:</i> Riverine  <i>Substrate:</i> 100 percent sandy clay  <i>Snags and woody debris:</i>  Moderate large snags and woody debris  <i>Aquatic plants:</i> <i>Persicaria</i> sp.,  rushes (<i>Juncus</i> sp.) and reeds (<i>Phragmites australis</i>)  <i>Variety of habitat:</i> Macrophytes, undercut banks and extensive trailing vegetation present  <i>Aquatic fauna:</i> none observed  <i>Disturbance:</i> Rubbish, bank erosion observed</p>	<p>A riverine habitat with low flow at the time of assessment, up to 6 m wide. Tall, mature riparian vegetation. Limited native aquatic vegetation. Extensive exotic grasses and herbaceous weeds on banks. Undercut banks and extensive trailing vegetation are present. Turbid water, bank erosion and rubbish present. Site may provide refuge habitat and value for fish.</p>	 <p>Upstream</p>  <p>Downstream</p>

Site code and name	Habitat assessment summary	General description and habitat characteristics	Representative photograph
<p><b>6</b> <b>Bungil Creek at Two Mile Rd</b></p>	<p><i>Habitat type:</i> Riverine  <i>Substrate:</i> 100 percent sandy clay  <i>Snags and woody debris:</i> Limited large snags and woody debris  <i>Aquatic plants:</i> Limited <i>Persicaria</i> sp. and rushes (<i>Juncus</i> sp.)  <i>Variety of habitat:</i> Macrophytes, undercut banks and trailing vegetation present  <i>Aquatic fauna:</i> none observed  <i>Disturbance:</i> Rubbish, crossing, bank erosion observed, cattle access</p>	<p>A riverine habitat with low flow at the time of assessment, up to 15 m wide. Tall, some mature riparian vegetation. Limited native aquatic vegetation. Extensive exotic grasses and herbaceous weeds on banks. Some undercut banks and trailing vegetation are present. Extensive erosion at the crossing, turbid water with scum on the water surface and cattle trampling. Site may provide refuge habitat and value for fish.</p>	 <p>Upstream</p>  <p>Downstream</p>

## 5. Constraints Analysis

Ecological values that were identified within the Study Area may be subject to two predominant impacts from the flood mitigation options:

- direct removal as a result of levee construction or other earthworks;
- changes to the hydrological regime.

The presence of matters of national environmental significance within the Study Area represents the key environmental constraint to the Project. Although Weeping Myall Woodlands occur on alluvial floodplains, SEWPaC's listing advice for this matter of national environmental significance states that this community is restricted to flat areas, shallow depressions or gilgais on raised alluvial plains that are rarely if ever flooded (TSSC 2008). As such, any proposal to modify the current flooding regime of this community in terms of frequency and/or duration of inundation has the potential to impact this matter of national environmental significance. Similarly, Brigalow communities are unlikely to tolerate frequent or prolonged inundation. Therefore, the proposed works have the potential to result in the loss of one or both of these TECs from the study area over time. In this regard, it is relevant to note that SEWPaC's *Matters of National Environmental Significance - Significant Impact Guidelines v 1.1 (Commonwealth of Australia, 2009)* state that an impact to a TEC is considered significant if there is a possibility that the extent of the TEC will be reduced. This would be assessed via an EPBC Referral (SEWPaC) if it is considered that the known extent of this TEC is likely to be significantly impacted by the selected Stage 2 mitigation options. This should inform future options assessments.

Other matters of national environmental significance, namely threatened and migratory species, of relevance to the Study Area mainly rely on the remnant woodland (RE 11.3.25) within the riparian zone associated with Bungil Creek. Limiting disturbance and clearing of riparian vegetation along Bungil Creek will limit to the impact upon suitable habitat for these species that is available in the Study Area. As such, it is not anticipated that a significant impact to threatened and/or migratory species (in accordance with SEWPaC's guidelines) will occur as a result of the proposed works. This matter would also be addressed by an EPBC Referral.

With regards to the remnant and High Value Regrowth vegetation within the study area, it is relevant to note that the existing vegetation consists of riparian communities that are characteristically tolerant of occasional flooding, and as such it is not anticipated that the proposed works will lead to deterioration or reduced extent of remnant and/or High Value Regrowth vegetation within the study area. Nevertheless, it would be beneficial to undertake consultation with DNRM and DEHP so as to confirm the Departments' views on the proposed works in terms of potential impacts to native vegetation, flora and fauna.

The Stage 2 High Flow diversion channel and the High western diversion drain have the potential to reduce the flushing of Bungil Creek between East Miscamble St and Creek St. The High Flow diversion channel is designed to divert > 10 year ARI event flow. A reduction in flushing of Bungil Creek may influence water quality and sedimentation in Bungil Creek. Modelling of changes to the hydrological regime in the Study Area during a 10 year ARI event is required to determine impacts on Weeping Myall Woodlands, Brigalow communities, water quality and sedimentation.

During the Stage 2 options assessment consideration should also be given of the need for design solutions to source licence or permit under the Water Act or Fisheries Act. Operational and construction work for taking or interfering with water under the *Water Act 2000* include:

- taking, or interfering with, water from a watercourse, lake or spring or from a dam constructed on a watercourse
- taking, or interfering with
  - overland flow water
  - sub-artesian water
  - controlling the flow of water into or out of a watercourse, lake or spring in a specified area declared under the *Water Act 2000*.

A water licence under Part 6 of the Water Act may be required for Stage 2 mitigation options as overland flow water will be affected by the construction of the High Flow diversion channel. The drainage lines within the Study Area may also qualify as watercourses under the Water Act. Under the Water Act, approval is also required for disturbance to the bed and banks of any freshwater streams (Riverine Protection Permit). Part 8, Division 1 of this Act outlines the granting permits for destroying vegetation, excavating or placing fill in a watercourse, lake or spring.

An application for a waterway barrier permit under the Fisheries Act may also be required if the Stage 2 mitigation options require any construction across Bungil Creek or if construction works alter the watercourse. The design of these structures should be consistent with the *Waterway barrier works development approvals* (Peterken *et al.* 2009), *Fisheries Guidelines for Fish-Friendly Structures* (Derbyshire 2006) and *Fisheries guidelines for design of stream crossings* (Cotterell 1998). Consideration of these matters during design option assessment may mitigate the need to source permits or minimise environmental impact, thereby informing permit application.

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# Appendices

# **Appendix A** – Protected Matters Search Results



## EPBC Act Protected Matters Report

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

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

Information is available about [Environment Assessments](#) and the EPBC Act including significance guidelines, forms and application process details.

Report created: 05/06/13 17:22:24

### [Summary](#)

### [Details](#)

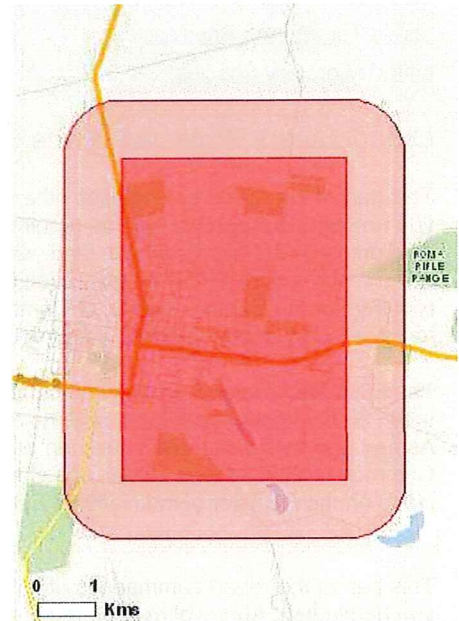
[Matters of NES](#)

[Other Matters Protected by the EPBC Act](#)

[Extra Information](#)

### [Caveat](#)

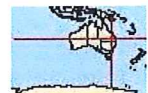
### [Acknowledgements](#)



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](#).

<a href="#">World Heritage Properties:</a>	None
<a href="#">National Heritage Places:</a>	None
<a href="#">Wetlands of International Importance:</a>	1
<a href="#">Great Barrier Reef Marine Park:</a>	None
<a href="#">Commonwealth Marine Areas:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	2
<a href="#">Listed Threatened Species:</a>	12
<a href="#">Listed Migratory Species:</a>	9

## Other Matters Protected by the EPBC Act

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

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As [heritage values](#) of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place and the heritage values of a place on the Register of the National Estate.

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

A [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.

<a href="#">Commonwealth Land:</a>	1
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	9
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves:</a>	None

## Extra Information

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

<a href="#">Place on the RNE:</a>	5
<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	23
<a href="#">Nationally Important Wetlands:</a>	None
<a href="#">Key Ecological Features (Marine)</a>	None

## Details

### Matters of National Environmental Significance

Wetlands of International Importance (RAMSAR)	<a href="#">[ Resource Information ]</a>
Name	Proximity
<a href="#">Narran lake nature reserve</a>	Upstream from Ramsar

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

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

Name	Status	Type of Presence
<a href="#">Coolibah - Black Box Woodlands of the Darling Riverine Plains and the Brigalow Belt South Bioregions</a>	Endangered	Community may occur within area
<a href="#">Weeping Myall Woodlands</a>	Endangered	Community likely to occur within area

### Listed Threatened Species [\[ Resource Information \]](#)

Name	Status	Type of Presence
Birds		
<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat may occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Neochmia ruficauda ruficauda</a> Star Finch (eastern), Star Finch (southern) [26027]	Endangered	Species or species habitat likely to occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Fish		
<a href="#">Maccullochella peelii</a> Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area
Mammals		
<a href="#">Chalinobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within

Name	Status	Type of Presence area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	Species or species habitat may occur within area
<a href="#">Nyctophilus corbeni</a> South-eastern Long-eared Bat [83395]	Vulnerable	Species or species habitat may occur within area
<a href="#">Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)</a> Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
<a href="#">Delma torquata</a> Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
<a href="#">Egernia rugosa</a> Yakka Skink [1420]	Vulnerable	Species or species habitat known to occur within area
<a href="#">Furina dunmalli</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
Listed Migratory Species		[ Resource Information ]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Migratory Marine Birds		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
<a href="#">Haliaeetus leucogaster</a> White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

## Other Matters Protected by the EPBC Act

### Commonwealth Land

[\[ Resource Information \]](#)

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

#### Name

Defence - ROMA TRAINING DEPOT

### Listed Marine Species

[\[ Resource Information \]](#)

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

Name	Threatened	Type of Presence
<b>Birds</b>		
<a href="#">Apus pacificus</a>		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<a href="#">Ardea alba</a>		
Great Egret, White Egret [59541]		Species or species habitat known to occur within area
<a href="#">Ardea ibis</a>		
Cattle Egret [59542]		Species or species habitat likely to occur within area
<a href="#">Gallinago hardwickii</a>		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Haliaeetus leucogaster</a>		
White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
<a href="#">Merops ornatus</a>		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Myiagra cyanoleuca</a>		
Satin Flycatcher [612]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a>		
Rufous Fantail [592]		Species or species habitat known to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a>		
Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area

## Extra Information

### Places on the RNE [ Resource Information ]

Note that not all Indigenous sites may be listed.

Name	State	Status
<b>Historic</b>		
<a href="#">Ace Drapers</a>	QLD	Indicative Place
<a href="#">Hibernian Hall</a>	QLD	Indicative Place
<a href="#">Ladbrooks Butchery</a>	QLD	Indicative Place
<a href="#">Romavilla Winery</a>	QLD	Indicative Place
<a href="#">Roma War Memorial and Heroes Avenue</a>	QLD	Registered

### 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
<b>Birds</b>		
<a href="#">Anas platyrhynchos</a> Mallard [974]		Species or species habitat likely to occur within area
<a href="#">Columba livia</a> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<a href="#">Passer domesticus</a> House Sparrow [405]		Species or species habitat likely to occur within area
<a href="#">Sturnus vulgaris</a> Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
<a href="#">Bufo marinus</a> Cane Toad [1772]		Species or species habitat likely to occur within area
<a href="#">Rhinella marina</a> Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
<a href="#">Bos taurus</a> Domestic Cattle [16]		Species or species habitat likely to occur within area
<a href="#">Felis catus</a> Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
<a href="#">Oryctolagus cuniculus</a> Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
<a href="#">Sus scrofa</a> Pig [6]		Species or species habitat likely to occur within area
<a href="#">Vulpes vulpes</a> Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		

Name	Status	Type of Presence
<a href="#">Acacia nilotica subsp. indica</a> Prickly Acacia [6196]		Species or species habitat may occur within area
<a href="#">Asparagus africanus</a> Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
<a href="#">Asparagus plumosus</a> Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
<a href="#">Dolichandra unguis-cati</a> Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
<a href="#">Lantana camara</a> 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
<a href="#">Lycium ferocissimum</a> African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
<a href="#">Opuntia spp.</a> Prickly Pears [82753]		Species or species habitat likely to occur within area
<a href="#">Parkinsonia aculeata</a> Parkinsonia, Jerusalem Thorn, Jelly Bean Tree, Horse Bean [12301]		Species or species habitat likely to occur within area
<a href="#">Parthenium hysterophorus</a> Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
<a href="#">Protasparagus plumosus</a> Climbing Asparagus-fern, Femy Asparagus [11747]		Species or species habitat likely to occur within area
<a href="#">Senecio madagascariensis</a> Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Hemidactylus frenatus</a> Asian House Gecko [1708]		Species or species habitat likely to occur within area

## Coordinates

-26.54431 148.78406,-26.54431 148.81954,-26.59472 148.81954,-26.59472 148.78406,  
-26.54431 148.78406

## Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

## Acknowledgements

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

- [Department of Environment, Climate Change and Water, New South Wales](#)
- [Department of Sustainability and Environment, Victoria](#)
- [Department of Primary Industries, Parks, Water and Environment, Tasmania](#)
- [Department of Environment and Natural Resources, South Australia](#)
- [Parks and Wildlife Service NT, NT Dept of Natural Resources, Environment and the Arts](#)
- [Environmental and Resource Management, Queensland](#)
- [Department of Environment and Conservation, Western Australia](#)
- [Department of the Environment, Climate Change, Energy and Water](#)
- [Birds Australia](#)
- [Australian Bird and Bat Banding Scheme](#)
- [Australian National Wildlife Collection](#)
- Natural history museums of Australia
- [Museum Victoria](#)
- [Australian Museum](#)
- [SA Museum](#)
- [Queensland Museum](#)
- [Online Zoological Collections of Australian Museums](#)
- [Queensland Herbarium](#)
- [National Herbarium of NSW](#)
- [Royal Botanic Gardens and National Herbarium of Victoria](#)
- [Tasmanian Herbarium](#)
- [State Herbarium of South Australia](#)
- [Northern Territory Herbarium](#)
- [Western Australian Herbarium](#)
- [Australian National Herbarium, Atherton and Canberra](#)
- [University of New England](#)
- [Ocean Biogeographic Information System](#)
- [Australian Government, Department of Defence](#)
- [State Forests of NSW](#)
- [Geoscience Australia](#)
- [CSIRO](#)
- Other groups and individuals

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

Please feel free to provide feedback via the [Contact Us](#) page.

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## **Appendix B** – Wildlife Online Results

## Maranoa Regional Council

Wednesday 05 Jun 2013 12:50:36

- 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). The second number located after the / indicates the number of specimen records for the taxon.

Kingdom	Class	Family	Scientific Name	Common Name	Q	A	Sighting Records	Specimen Records
animals	birds	Ardeidae	<i>Botaurus poiciloptilus</i>	Australasian bittern	C	E	2	0
animals	birds	Estrildidae	<i>Poephila cincta cincta</i>	black-throated finch (white-rumped subspecies)	E	E	1	0
animals	birds	Estrildidae	<i>Neochmia ruficauda ruficauda</i>	star finch (eastern subspecies)	E	E	1	0
animals	birds	Rostratulidae	<i>Rostratula australis</i>	Australian painted snipe	V	E	3	0
animals	mammals	Dasyuridae	<i>Dasyurus hallucatus</i>	northern quoll	C	E	7	0
animals	mammals	Vombatidae	<i>Lasiorhinus krefftii</i>	northern hairy-nosed wombat	E	E	1	0
animals	reptiles	Agamidae	<i>Tympanocryptis cf. tetraporophora</i>	Darling Downs earless dragon	E	E	5	0
animals	birds	Psittacidae	<i>Psephotus pulcherrimus</i>	paradise parrot	PE	EX	4	0
animals	birds	Columbidae	<i>Geophaps scripta scripta</i>	squatter pigeon (southern subspecies)	V	V	92	1
animals	birds	Psittacidae	<i>Polytelis swainsonii</i>	superb parrot	C	V	1	0
animals	mammals	Dasyuridae	<i>Dasyurus geoffroii geoffroii</i>	western quoll	PE	V	1	0
animals	mammals	Macropodidae	<i>Petrogale penicillata</i>	brush-tailed rock-wallaby	V	V	2	0
animals	mammals	Peramelidae	<i>Macrotis lagotis</i>	greater bilby	E	V	1	1
animals	mammals	Phascolarctidae	<i>Phascolarctos cinereus</i>	koala	C	V	68	0
animals	mammals	Vespertilionidae	<i>Chalinolobus dwyeri</i>	large-eared pied bat	V	V	2	0
animals	mammals	Vespertilionidae	<i>Nyctophilus corbeni</i>	eastern long-eared bat	V	V	1	0
animals	reptiles	Elapidae	<i>Furina dunmalli</i>	Dunmall's snake	V	V	3	0
animals	reptiles	Pygopodidae	<i>Delma torquata</i>	collared delma	V	V	7	2
animals	reptiles	Scincidae	<i>Egernia rugosa</i>	yakka skink	V	V	5	0

**Study Area**

Latitude: 26.5288 to 26.5944

Longitude: 148.7793 to 148.8297

Wednesday 05 Jun 2013 13:10:16

Kingdom	Class	Family	Scientific Name	Common Name	Q	A	Sighting Records	Specimen Records
animals	birds	Rostratulidae	Rostratula australis	Australian painted snipe	V	E	1	0
animals	mammals	Phascolarctidae	Phascolarctos cinereus	koala	C	V	5	0
animals	reptiles	Scincidae	Egernia rugosa	yakka skink	V	V	1	0

## **Appendix C – Geomorphology Memo**



# Memorandum

18 July 2013

To	Megan Holcomb		
Copy to	John Postlethwaite		
From	Guy Lampert	Tel	02 4979 9937
Subject	Rome Stage 2 -Geomorphology	Job no.	4125323

## 1 Introduction

The Bungil Creek catchment is a relatively small catchment upstream of Roma, covering an area of approximately 1400 km<sup>2</sup>. Bungil Creek is ephemeral and flows in a southerly direction and joins with the Balonne River which is part of the greater Murray-Darling system. The Bungil Creek catchment is within the Brigalow Belt Bioregion.

Average rainfall throughout the Bungil Creek catchment is 700 mm per annum. There is a high degree of variability in regards to seasonal rainfall, with the summer months dominating rainfall totals within the catchment.

Major flooding in the Bungil Creek is relatively infrequent. However, under certain meteorological conditions such as tropical low pressure systems, heavy rainfalls can occur throughout the catchment which can result in significant riverine flooding.

Following the flood events of 2010, 2011 and 2012, Maranoa Regional Council (MRC) has been assessing potential flood mitigation options for the township of Roma. Flood studies of the Bungil Creek catchment to ascertain flooding characteristics and investigate flood mitigation options are currently underway.

The mitigation project has been divided into two (2) main stages. Stage 1 incorporates a proposed levee that extends from the airport and continues south to finish near Lovell Street (approximately 4.6 km long). Stage 2 is defined as an investigation area downstream of Stage 1 that may consider options such as extensions to the Stage 1 levee, diversion drains, detention areas and creek realignment.

GHD anticipates that the following engineering options, either individually or in combination, will be considered during the Stage 2 options analysis:

- Three locations in the floodplain for proposed levees.
- Two locations for a high flow channel diversion.
- Two locations for detention.
- Warrego Highway embankment/culvert modifications.
- Variable flood gates at the location of the proposed levee.
- Influence of Bungie Creek, downstream of Warrego Highway.

JobNumber /DocNumber

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## **2 Purpose**

GHD performed a geomorphological assessment for the Stage 2 investigation area primarily along Bungil Creek. As a part of this assessment, GHD performed the following activities:

- A desktop assessment primarily involving the review of aerial imagery to characterise the general form of Bungil Creek in the investigation area.
- A site investigation to further document waterway form and function at targeted locations in the investigation area.
- A review of hydraulic modelling outputs of existing conditions with those from the preferred Stage 2 options.

## **3 Existing Conditions**

Bungil Creek can be classified as an alluvial, fine grained river style in moderate geomorphic condition. Through the investigation area Bungil Creek is characterised by having a moderate sinuous (sinuosity 1.3 to 1.5) channel set within broad alluvial floodplains. Channel dimensions are typically between 30 to 50 metres wide and up to 5 metres deep at bankfull and channel shape is compound in cross-section due to the presence of narrow inset benches. The channel generally holds water in isolated pools between flows (Figure 3-3).

The channel is of low gradient (less than 0.001 m/m) and low energy such that sediment transported is predominantly limited to fine sands, silts and clays in suspension. While some deposits of readily mobilised sand were observed, there was no evidence of any significant channel aggradation.

Banks are dominantly composed of silt and clay and are largely well-vegetated. Bank erosion is generally localised to the outside banks of meander bends, although evidence of erosion at stormwater outlets is apparent through the reach where Bungil Creek passes through Roma.

The low capacity channel allows overbank flows to be readily dissipated across the floodplain surfaces, depositing fine grained sediments on the floodplain. Floodplains are largely cleared for agricultural purposes and to support pasture grasses.

## **4 Constraints**

The key components of the Preferred Stage 2 Flood Mitigation Option Combination (preferred option) that could directly impact on the geomorphology of the Bungil Creek are:

- The extension of the Stage 1 western levee.
- The provision of the Eastern and Western Diversion Channels.
- The Eastern Levee.

The effect of the preferred option combination on hydraulic conditions along Bungil Creek in combination with the Stage 1 levee has been modelled using a 2-Dimensional hydraulic model for the 10 and 100 Year ARI design flows. The results of this modelling are outlined in GHD (2013) and indicate the following velocity changes along the Bungil Creek by location between existing and developed conditions.

### **Upstream of the Eastern Diversion Offtake**

Under the 10 Year ARI, flow velocities across the floodplains north of the Eastern Diversion generally experience minor increases of less than 0.5 m/s in response to the constriction of flow by the Stage 1 levee. Localised increases in the order of 1.0 m/s are also predicted, principally along existing flood channels. Under the 100 year ARI, floodplain flow velocities are predicted to be generally between 1.5 to 2.5 m/s in response to increases in the range of 0.5 to 1.0 m/s. Such velocities pose a moderate risk for floodplain scour, particularly if a good ground cover is not maintained.

Flow velocities within the channel largely experience minor changes of less than plus/minus 0.1 m/s under the 10 year ARI. Under the 100 year ARI flow conditions, while channel velocity increases of 0.1 to 0.5 m/s are predicted, the flow velocities largely remain in the range of those experienced under existing conditions of 1.0 to 2.0 m/s. Hence, no significant impact on channel scour and deposition is expected.

The exception to the above is an approximate 200 to 300 metre section along the western bank of Bungil Creek between East Miscamble Street and the downstream extent of the Stage 1 levee. Here velocities are predicted to increase by 1.5 to 2.0 m/s for the 10 year ARI and more than 2.0 m/s under the 100 year ARI, such that resultant velocities are in order of 3.0 to 5.0 m/s. These velocities present a high risk for erosion of the western bank in this section.

The velocity increases in this section are considered to be the result of a combination of the additional draw on flow associated with the Eastern Diversion as well as impingement on flow by the downstream end of the Stage 1 levee where its alignment curves to meet the channel. Hence, the velocity increases and erosion risk could be reduced through reconfiguring the alignment of the Stage 1 levee and/or widening the 'mouth' of the Eastern Diversion.

### **Bungil Creek Downstream of the Eastern Diversion Offtake**

Flow velocities in the channel are predicted to reduce generally in the range of 0.1 to 0.5 m/s for both the 10 year and 100 year ARI events for the section Bungil Creek from the offtake of the Eastern Diversion downstream to where the Eastern diversion crosses Bungil Creek. This could result in reduced sediment transport capacity leading to the infilling of any pools and channel aggradation in this reach. However, Bungil Creek dominantly transports sediment in suspended load and flow velocities under developed conditions are maintained within the range of 0.5 to 1.5 m/s within the channel. Such velocities are capable of retaining fine sand, mud and silt in suspension. Hence, the sediment transport and pool flushing capacity of flood events is expected to be maintained in this section of Bungil Creek.

Downstream of Lovell Street, the proposed Western levee extension runs in close proximity to the top of the western bank of Bungil Creek. Although flow velocities are reduced in the section, the levee may potentially be at risk from future bank erosion and channel migration. A detailed bank stability assessment with consideration of geotechnical conditions along this section is recommended to be undertaken as part of the detailed design phase.

### **Eastern Diversion**

Flow velocities along the eastern diversion are predicted to increase largely in the range of 1.0 to 2.0 m/s under both events, with flow velocities generally ranging from 1.5 to 2.5 m/s under the 100 year ARI. Such velocities present a moderate risk for erosion of the diversion channel, particularly if a good ground cover is not maintained. Critical to the diversion channel will be the potential for any bed erosion which

could initiate headcutting and deepening of the channel, leading to the eventual avulsion (capture) of Bungil Creek into the diversion alignment. The risk for headcut initiation will be highest at the two diversion re-entry locations to Bungil Creek. These locations will require appropriate stabilisation measures to limit the risk for headcut initiation. Further consideration will also be required to maintaining the stability of the bed and banks of the proposed diversion channels.

### **Western Diversion**

Along the Western Diversion flow velocities increase largely by less than 0.5 m/s for both events, although localised increases in the range of 0.5 to 1.0 m/s are predicted under 100 year ARI flow conditions. Nevertheless, under 100 year ARI flow velocities are largely maintained below 1.5 m/s and the risk for any erosion of significance is considered low.

### **General**

Elsewhere, the increases/reductions in velocities are not considered to be of sufficient magnitude to result in any significant change in the extent or severity of erosion or deposition along the channel or floodplains of Bungil Creek. Typically flow velocities remain in the same general range under developed conditions as to those under existing conditions.

Regards

**Guy Lampert**

Senior Geomorphologist

GHD

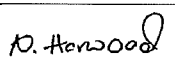
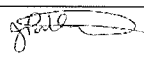
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Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
A	Draft	Neil Harwood		J Postlethwaite		14/06/2013
1	Final	Neil Harwood		J Postlethwaite		09/10/2013

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