

# **Attachment 2: Bruce Highway (Cooroy to Curra) Upgrade Section C (Traveston Road to Keefton Road) Project Job No. 232/10A/2**

**Impact Assessment and Erosion and Sediment Control Plan – Mary River Turtle, Mary River Cod and White-throated Snapping Turtle**

August 2015

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# Glossary

Term	Description
DAF	Department of Agriculture and Fisheries
DoE	Department of the Environment
EHP	Department of Environment and Heritage Protection
EMP(C)	Environment Management Plan (Constriction)
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Environmental Risk Assessment
ESCP	Erosion and Sediment Control Plan
IECA	International Erosion Control Association
IECA Manual	International Erosion Control Association (IECA) Best Practice Sediment and Erosion Manual
IUCN	International Union for Conservation of Nature
MNES	Matters of National Environmental Significance
MRCCC	Mary River Catchment Coordinating Committee
MRTS51 – Environmental Management	Department of Transport and Main Roads Technical Specification MRTS51 Environmental Management
MRTS52 – Erosion and Sediment Control	Department of Transport and Main Roads Technical Specification MRTS52 Erosion and Sediment Control
MSDS	Material Safety Data Sheet
NC Act	Nature Conservation Act 1992
NRM	Department of Natural Resources and Mines'
PESCP	Progressive Erosion and Sediment Control Plans
SPRAT	Species Profile and Threats Database
TMR	Department of Transport and Main Roads
VEC	Valuable Environmental Components
WQO	Water quality objectives

# 1. Introduction

## 1.1 Purpose and Scope

This Impact Assessment and Erosion and Sediment Control Plan (ESCP) (the Report) has been prepared for the Bruce Highway (Cooroy to Curra) Upgrade Section C (Traveston Road to Keefton Road) Project (herein referred to as the Project) to address item (b) and inform item (c) of the request for additional information (RFI) from the Department of Environment (DoE). Item (b) and Item (c) request the following:

(b) An Erosion and Sediment Control Plan addressing the likely significant impact of the proposed action on the Mary River turtle (*Elusor macrurus*) and Mary River cod (*Maccullochella mariensis*);

(c) An assessment of the likelihood of residual impacts of the project, and where residual significant impacts are determined likely to occur, submit an offset proposal in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) *Environmental Offsets Policy October 2012*.

On completion of the public notification period, the DoE requested an update of the Preliminary Documentation to include the white-throated snapping turtle (*Elseya albagula*), and discuss whether the Project will significantly impact the species with specific consideration of the following:

- Details of suitable habitat for the species within and adjacent to the Project
- Potential impacts of the Project
- Control measures to manage, mitigate or offset the impacts.

The additional assessment has been included in Sections 2, 3 and 4 of this Report.

This Report has been prepared in accordance with the DoE's *Environmental Management Plan Guidelines* (2014) as required by the RFI.

Chapter 4 of this Report provides an assessment of the potential impacts of the Project on the Mary River turtle, the Mary River cod and the white-throated snapping turtle, in accordance with the DoE's *Significant Impact Guidelines 1.1* (2013), to inform a response to item (c). The result of the significant impact assessment concludes that no residual impacts to the Mary River turtle, the Mary River cod or the white-throated snapping turtle were identified as a direct or indirect result of the Project.

Consequently, the Residual Impact and Offset Proposal prepared for the Project does not nominate offsets for the Mary River turtle, the Mary River cod or the white-throated snapping turtle.

## 1.2 Report Structure

This Report is presented in two parts, Part A and Part B. Part A provides descriptions of the Mary River turtle, Mary River cod and the white-throated snapping turtle and evaluates the potential for significant impacts to occur as a result of the Project on each of the species. The risk assessment has been undertaken utilising the risk assessment framework provided in the DoE's *Environmental Management Plan Guidelines* (2014) as requested by the RFI.

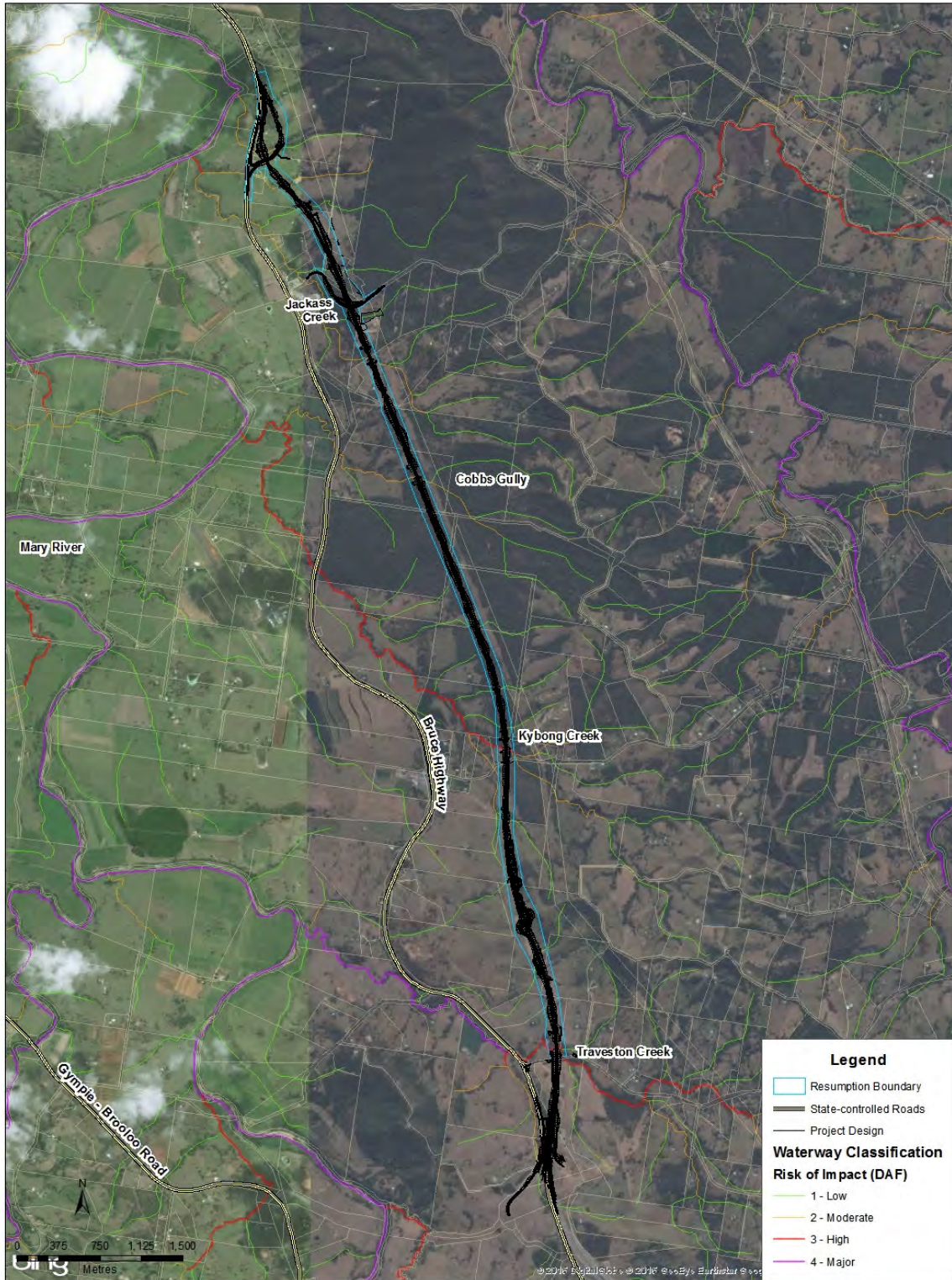
Part B forms the ESCP, which denotes the specific measures to be incorporated in the construction of the Project to mitigate and manage the potential for downstream impacts to the Mary River turtle, Mary River cod and the white-throated snapping turtle. This Report includes reference to the 'Project area', defined as the extent of the resumption boundaries for the Project, as shown on Figure 1. Clearing for the works will be within clearly defined no-go zones however the Report has been prepared with consideration of the whole area.

## 1.3 Project Location

The Project is located 160km north of Brisbane, extending for approximately 11km between Traveston Road, Traveston (18km south of Gympie) and Keefton Road, Woondum (6km south of Gympie). The Project is located within the upper Tianna Creek sub-catchment of the Mary River catchment, and crosses Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek and associated tributaries. The Mary River catchment covers an area of approximately 9,400 km<sup>2</sup> (Pointon, 1998). Originating in the Conondale Range to the south of the Project area, the Mary River drains north to an estuary in the Great Sandy Strait near Maryborough; a length of approximately 307 km (Pointon, 1998). A plan illustrating the location of the Project in relation to the existing Bruce Highway and the Mary River is provided in Figure 1.

Construction activities for the Project will include vegetation clearing, including riparian vegetation; major earthworks, temporary and permanent waterway diversions, construction and use of temporary access tracks, construction of embankments and cuttings, installation of temporary and permanent culverts, construction of bridges, pavement construction, fencing, landscaping and rehabilitation works. Table 1 summarises the construction works located on each of the four major waterways along the length of the alignment. These include Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek. Construction works will also occur on a number of minor tributaries leading to these waterways, however due to the specific habitat requirements of the Mary River turtle, Mary River cod and the white-throated snapping turtle (requiring waterway characteristics typical of permanent waterways) these ephemeral tributaries have not been described in detail. However, erosion and sediment control (ESC) measures included in this Report will address both major waterways and minor tributaries intersected by the Project. Table 1 also provides the distance of each instream construction works from the confluence of the Mary River and provides a description of any existing structures or downstream barriers in the waterways.





PROJECT NO. 30031298	SKETCH SK-1298-0201	ISSUE 01
PROJECT TITLE Cooroy to Curra (Section C)	CREATED BY KM11809	DATE 29/05/2015 Time: 4:48:35 PM
COORDINATE SYSTEM GDA 1984 MGA Zone 56	SOURCE QLD Govt, SKM, SMEC, BING	Copyright SMEC Australia Pty Ltd. All Rights Reserved. © State of Queensland (Department of Natural Resources and Mines) 2014. Updated data available at <a href="http://dds.information.qld.gov.au/dds/">http://dds.information.qld.gov.au/dds/</a>
PAGE SIZE A3	SCALE	  CONSULTANT SMEC Australia

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Figure 1: Project Location

Attachment 2: Bruce Highway (Cooroy to Curra) Upgrade Section C (Traveston Road to Keefton Road) Project Job No. 232/10A/2 – Impact Assessment and Erosion and Sediment Control Plan – Mary River Turtle, Mary River Cod and White-throated Snapping Turtle



**Table 1: Waterways<sup>1</sup> within the Project area**

<b>Waterway</b>	<b>Instream works</b>	<b>Distance from confluence with Mary River</b>	<b>Downstream barriers</b>
<b>Traveston Creek</b>	New parallel bridge structures to be constructed across waterway. 142m permanent waterway diversion, flow to be maintained through a temporary diversion channel.	Approx. 3km upstream	Culverts beneath existing Bruce Highway, existing Traveston Crossing Road structure, collapsed culvert and weir immediately downstream.
<b>Kybong Creek</b>	New parallel bridge structures to be constructed across waterway. 173m permanent waterway diversion, flow to be maintained through a temporary diversion channel.	Approx. 3.7km upstream	Road culverts associated with the existing Bruce Highway. Existing farm dam.
<b>Cobbs Gully</b>	New parallel bridge structures to be constructed across waterway. 163.4m permanent waterway diversion, in two sections. Flow to be maintained through a temporary diversion channel.	Cobbs Gully flows to Kybong Creek, ultimately joining the Mary River approx. 2km downstream.	Road culverts associated with the existing Bruce Highway.
<b>Jackass Creek</b>	New parallel bridge structures to be constructed across waterway. 119m permanent waterway diversion. Flow to be maintained through a temporary diversion channel.	Approx. 2.8km	Large farm dam, culvert under Woondum Road, and road culverts associated with the existing Bruce Highway.

<sup>1</sup> This includes waterways mapped in accordance with the Department of Agriculture and Fisheries (DAF) 'Guide for the determination of waterways using the spatial data layer Queensland waterways for waterway barrier works' Attachment 2: Bruce Highway (Cooroy to Curra) Upgrade Section C (Traveston Road to Keefton Road) Project Job No. 232/10A/2 – Impact Assessment and Erosion and Sediment Control Plan – Mary River Turtle, Mary River Cod and White-throated Snapping Turtle

# Part A: Impact Assessment

## 2. Species Description

This chapter describes the characteristics, habitat requirements and existing threats and impacts to the Mary River turtle, the Mary River cod and the white-throated snapping turtle.

### 2.1 Mary River Turtle

#### 2.1.1 Conservation Status

The Mary River turtle (*Elusor macrurus*) is listed as 'endangered' under the EPBC Act, and as such is considered a Matter of National Environmental Significance (MNES) - 'threatened species or communities' under the Act.

The Mary River turtle is also listed under Queensland's *Nature Conservation (Wildlife) Regulation 2006* (NC Act) and the International Union for Conservation of Nature (IUCN) *Red List of Threatened Species*: (2014.3 list) as an 'endangered' species.

#### 2.1.2 Distribution

The Mary River turtles' distribution is described as limited to flowing creeks with deep pools (often deeper than 3 m), and is documented as having a home range of up to 640m per day (Tucker, 1999, Flakus, 2002, SKM, 2007 in Jacobs SKM, 2014). There are numerous records of Mary River turtle in the Mary River (DEHP 2011). It has also historically been observed in Six Mile Creek (Cod Line 2002), which is to the north of the Project area. Surveys conducted for the Review of Environmental Factors (Jacobs SKM, 2014) also identified suitable habitat along Six Mile Creek but did not identify any individuals.

#### 2.1.3 Habitat Requirements

The Mary River turtle generally inhabits well-oxygenated pools associated with riffle zones. Habitat pools vary in depth from <1 m to >6 m and generally have a sand or gravel bottom, steep sides and an abundance of submerged shelter in the form of fallen logs, boulders, undercut banks and aquatic vegetation. Very little information is known about the habitat requirements of hatchling turtles however, rocky outcrops are thought to be of importance (Flakus, 2002; Tucker, 1999).

Nesting of the Mary River turtle is primarily restricted to alluvial sand/loam banks that occur in depositional areas. These banks generally form at the river's edge and extend back into the immediate riparian zone, however islands are also known to occur in places. There is insufficient evidence available on species specific nesting requirements to accurately describe optimal nesting bank conditions however banks are generally large, steep and sparsely vegetated. Eggs are laid between two (2) m and 50 m away from the waters' edge and are an average of 2.3 m above water level (Flakus, 2002; Flakus and Connell, 2008). Nesting occurs from October to January and females are thought to return to the same nesting banks each year. Historically Mary River turtles were observed nesting on mass after the first summer rains, however, since the number of breeding individual have been reduced in recent years, mass nesting has not been recorded (Flakus and Connell, 2008). Illegal poaching during the 1960's and 1970's and high nest predation by feral dogs, foxes and goannas, has result in a 90% reduction in Mary River turtle nesting in the last 50 years (Flakus and Connell, 2008).

The home range of the Mary River turtle is small with daily movements averaging 200m. During the breeding season, female turtles may make average daily movements of around 2km, however migrations of up to 7km have been recorded (Flakus, 2002). Male turtles are also known to increase movement during the breeding season. During flooding events, the Mary River turtle moves upstream against the current into small creeks, backwaters or eddies. When the water flow subsides, the turtles move back to the same pool from which they originated (Flakus, 2002). Movement over land is only known to occur between adjacent pools.

Adult Mary River turtles are primarily herbivorous with aquatic plants making up 79% of their diet. Two percent of their diet consists of buds, seeds and fruit from terrestrial plants while aquatic insect larvae make up the remainder of their diet. Freshwater mussels (*Velesuio ambiguus*) are thought to be an occasional food. In comparison, the diet of hatchling and juvenile turtles consists of aquatic insect larvae (53%), freshwater sponges (21%) and aquatic plants (25%) (Cann & Leger 1994, Flakus 2000, Flakus 2002).

The Mary River turtle has the ability to respire aquatically with hatchlings obtaining up to 50% of their total oxygen requirements from the water (Clark, 2008). Aquatic respiration is achieved via diffusion over the skin or by active ventilation of the cloacal bursae. Being able to supplement aerial oxygen stores with aquatic oxygen allows this turtle species to significantly increase dive duration and reduce surfacing frequency. Hatchling Mary River turtles are able to remain submerged underwater for over 2.5 days without surfacing for air. Benefits of increased dive duration include more time for foraging (particularly in riffles), reduced predator exposure and decreased energetic costs of surfacing.

## 2.1.4 Existing Threats and Impacts

A review of existing reports and studies identified several existing threats and impacts to the Mary River turtle within the Mary River catchment. Key threats include habitat degradation, reduction in water quality and the disturbance of nests and nesting sites. Each of the key threats and associated impacts to the species are described in further detail in Table 2.

The majority of the impacts to the species are attributed to current land management practices and the presence of barriers such as farm dams and impoundments within the catchment. Therefore the threats to the Mary River turtle that are considered relevant to the assessment of potential impacts from the Project include:

- Aquatic and riparian habitat degradation: loss of riffles, loss of macrophytes and reduced recruitment of logs and large woody debris
- Reduced water quality: effects of increased runoff, siltation and pollution from land use practises
- Nest disturbance: increase of sediment loads smothering nesting sites downstream.
- An assessment of these Project-related impacts is provided in Section 4 of this Report.

**Table 2: Existing threats and impacts to the Mary River turtle**

Threat	Impacts
<b>Habitat degradation</b>	<ul style="list-style-type: none"> <li>• Studies suggest that the Mary River turtle is detrimentally affected by impoundments due to the loss of riffle habitats and the disappearance of food items such as aquatic plants (macrophytes), windfall fruits from riparian vegetation and some aquatic invertebrates (Tucker, 2000 in DoE, 2015a).</li> <li>• Turtles may be directly impacted through the improper design of impoundments leading to injury from being caught in floodways and high velocity water flows. Impoundments may also impact on turtles by changing flow regimes (DEHP, 2011), which in turn may impact water quality, influence stream morphology (both upstream and downstream of the impoundment) and limit the recruitment of large woody debris.</li> <li>• Removal of riparian vegetation prevents recruitment of logs into the instream environment. (DEHP 2011) notes that '<i>emergent logs and log jams may be important elements of the Mary River turtle microhabitat</i>', providing resting and foraging opportunities.</li> </ul>
<b>Reduced water quality</b>	<ul style="list-style-type: none"> <li>• Turtles that rely on cloacal respiration (i.e. <i>Elusor</i> and <i>Elseya</i> species) are disadvantaged in stratified, low-oxygenated, turbid water in impoundments (Tucker, 2000). DEHP (2011) notes '<i>The Mary River turtle is a cloacal ventilator (meaning it takes in oxygen through its bottom - a 'bum breather') and historically these types of freshwater turtle do not do well in large standing water bodies. Cloacal ventilation allows the species to stay under water for days at a time when the water is flowing and well oxygenated</i>'.</li> <li>• Water quality in the streams Mary River turtle inhabit has declined in the past 20 years (DoE, 2011 in DoE, 2015a). Parts of the Mary River catchment have been cleared and heavily grazed. Along cleared and grazed reaches of the Mary River and tributaries devoid of riparian vegetation, the turtle is threatened by the effects of increased runoff, siltation and pollution. A reduction in water quality can be attributed to chemical pollution and sediment runoff; commercial sand-mining upstream of turtle populations; and the direct and indirect effects of grazing activity, which may also influence changes in flow rates (DEHP, 2011).</li> </ul>
<b>Nest disturbance</b>	<ul style="list-style-type: none"> <li>• Mary River turtle nesting is threatened by egg predation from predatory animals including European foxes and goannas, and nest trampling by cattle (DEHP, 2011).</li> <li>• Based on limited observation at nesting areas in the lower catchment, it is concluded that the critical threat to survival of Mary River turtles within the Mary River catchment is the long term, pervasive and intense egg loss from predation and cattle trampling of nests (Limpus, 2008).</li> <li>• Increased sediment loads and changes in hydrology due to upstream impoundment are also recognised as potential impact on the nest site availability for this species.</li> </ul>

## 2.2 Mary River Cod

### 2.2.1 Conservation Status

The Mary River cod (*Maccullochella mariensis*) is listed as 'endangered' under the EPBC Act, and as such is considered a MNES - 'threatened species or communities'. This species is currently not listed under Queensland State legislation.

### 2.2.2 Distribution

The Mary River cod is endemic to the Mary River catchment in southeast Queensland. Historically, the Mary River cod were distributed throughout the Mary, Brisbane-Stanley, Albert-Logan and Coomera River systems (Wagner & Jackson 1993). Now, this species is found only in the Mary River system and there are reportedly less than 600 individuals remaining (Simpson & Jackson 2000). The distribution of the Mary River cod has also declined within the Mary River system and it is estimated that this species now occurs in less than 30% of its original range (Simpson & Jackson 2000) as recorded in the DoE SPRAT (DoE, 2015b). Within the system, Mary River cod are commonly found in Tinana-Coondoo Creek upstream from Tinana Barrage, Six Mile Creek downstream from Lake Macdonald, and upper Obi Creek (Simpson & Jackson 2000). The estimated total length of where the species is found is within a 51km range. Mary River cod have been stocked in impoundments since 1983 (including Lake Macdonald), both within and outside the Mary River system.

Surveys undertaken at the time of the development of the Mary River Cod Research and Recovery Plan (Simpson and Jackson 2000) indicated that there were three areas within the Mary River system where Mary River cod was relatively abundant including Tinana-Coondoo Creek upstream from Tinana Barrage, upper Obi Creek, and Six Mile Creek downstream from Lake Macdonald. Six Mile Creek was also identified as an important habitat for Mary River cod by Pickersgill (1998) and Burrows (2003). At Six Mile Creek, cod are typically found in slow moving pools with high riparian canopy cover, typically in association with large woody debris (Simpson & Jackson 2000). However, in the Obi Creek they are found in areas with a rocky substrate, little riparian cover and limited woody debris (DoE, 2015b).

More recent surveys have located significant numbers of larger Mary River cod on the main channel of the Mary River. The cod has also been reported in Amamoor Creek from McGills Creek to Amamoor Yabba Creek, Kandanga Creek, Glastonbury Creek (Pickersgill 1998), and Widgee Creek (Kennard 2003). The Mary River cod has a known distribution in the Mary River. Its home range extends up to 820m a day, but is recorded as having migration movements of up to 35km. (Tucker, 1999, Flakus, 2002, Pusey *et al.* 2004, SKM, 2007 in Jacobs SKM 2014). The Mary River cod is thought to occur in less than 30% of its former known range in the Mary River system (Simpson and Jackson, 2000).

### 2.2.3 Habitat Requirements

The Mary River cod is territorial and between periods of movement it occupies a particular home range between 70m and 1km in length for up to several years (Simpson & Mapleston 2002). Home range size is not related to the size of the fish, and does not change seasonally (Simpson & Jackson 2000).

The Mary River cod occurs mainly in pools within relatively undisturbed tributaries (Simpson & Jackson 2000). They prefer relatively large, deep (0.8 to 3.2m) and shaded pools with abundant, slowly flowing water (Simpson & Jackson 2000; EES 2003). However, they are known to use smaller tributary streams also during late winter when they migrate from the main river. Mary River cod are ambush predators and adults mainly consume fish (DoE, 2015b) and use submerged logs and



branches (snags) as cover from which to ambush prey, as resting sites, and as nesting sites (DoE, 2015b), The cod are often found within metres of woody debris structures (Simpson & Mapleston 2002).

Spawning occurs during spring when water temperatures reach above 20 degrees celsius (Harris & Rowland 1996). Mary River cod use hollow logs as spawning sites, and they deposit their eggs as a layer, where they adhere to the hard surface inside pipes or logs (Simpson & Mapleston 2002).

According to a radio-tracking study by Simpson and Mapleston (2002), 95% of locations of Mary River cod were in water between 1m and 3m deep, and the fish strongly avoids shallow areas (Simpson 1994). Cod were frequently found immediately downstream of a constriction of the stream (e.g. a riffle) where food was presumably concentrated by the water flow. Physiochemical parameters such as pH, conductivity, dissolved oxygen content and turbidity varied widely. Mary River cod appear to tolerate a wide range of conditions (Simpson 1994) and can tolerate high gradient upland stream habitats as well as slow-flowing lower reaches (Simpson & Jackson 2000). However, EES (2003) states they require good ecosystem health and water quality, and intact remnant riparian vegetation.

## 2.2.4 Existing Threats and Impacts

A review of existing reports and studies has identified several existing threats and impacts to the Mary River cod within the Mary River catchment as summarised in Table 3. Similar to the Mary River turtle, the majority of the impacts discussed in Table 3 are attributed to current land management practices and the presence of barriers such as dams and impoundments within the catchment. Therefore the relevant threats to the Mary River cod that are considered in the assessment of potential impacts from the Project include:

- Habitat degradation: loss of riparian vegetation and large woody debris, resulting in the loss of shaded pools, loss of snags, and increased erosion and sedimentation.
- Reduced water quality: effects of increased runoff, siltation and pollution.

An assessment of these Project-related impacts is provided in Section 4 of this Report.

**Table 3: Existing threats and impacts to the Mary River cod**

Threat	Impacts
Recreational fishing	<ul style="list-style-type: none"> <li>• Mary River cod have been heavily fished in the past resulting in a decrease in their numbers (Rowland, 1993 in Simpson &amp; Jackson 2000). Fishing for Mary River cod within the Mary River catchment is now prohibited, however evidence of continued illegal fishing pressure has been documented (Simpson and Jackson, 2000).</li> </ul>
Habitat degradation	<ul style="list-style-type: none"> <li>• Clearing of timber from the Mary River and its banks for agricultural development has resulted in erosion. Grazing and disturbance of banks by cattle inhibits the regeneration of native vegetation (Midgley, as cited in Rowland, 1993). Damage to the banks has caused extensive siltation and filling of pools in the main channel of the river (Cann, as cited in Cogger <i>et al.</i> 1993; Cann and Legler, 1994 in DoE, 2015b). Siltation causes a decline in water quality which alters stream macroinvertebrate communities that provide food for the cod, reducing the quantity and diversity of food (Wager and Jackson, 1993 in Simpson &amp; Jackson 2000).</li> <li>• Native riparian vegetation is crucial for Mary River cod, because they require shaded pools and woody debris (Midgley, as cited in Rowland, 1993). De-snagging has occurred in parts of the Mary River in the past, which has</li> </ul>

Threat	Impacts	
<b>Dams and weirs</b>	removed breeding habitat for the Mary River cod (Simpson and Jackson, 2000).	
	<ul style="list-style-type: none"> <li>• Loss of native vegetation due to dam construction is likely to be detrimental to the Mary River cod. Riverside trees provide necessary shade and shelter (Simpson and Jackson 2000), and are often lost when impoundments are constructed, because they do not tolerate root inundation (Tucker <i>et al.</i> 2000).</li> <li>• Weirs and waterway barriers (such as culverts) on tributaries of the Mary River can limit habitat connectivity by reducing flows or providing a barrier to fish passage in periods of low flow.</li> <li>• Releases of water storage from impoundments within the Mary River catchment (particularly Borumba Dam on Yabba Creek, Baroon Pocket Dam on Obi Creek, and Lake Macdonald on Six Mile Creek) are also likely to affect the timing of breeding and to reduce recruitment downstream (Simpson and Jackson 2000). Low water temperatures are likely to inhibit ovary development (Todd <i>et al.</i> 2005 in DoE, 2015b).</li> <li>• Overflows from farm dams can also change the water quality and habitat downstream, because they often release poorly oxygenated water, contain increase sediment loads and have the potential to cause bank erosion through flow regime changes (Walker, 1985).</li> <li>• Impoundments such as existing farm dams and weirs inhibit the movements of Mary River cod and prevent fish in different tributaries from interbreeding (Simpson and Mapleston, 2002).</li> </ul>	
	<b>Pollution</b>	<ul style="list-style-type: none"> <li>• Increased runoff entering the Mary River catchment from agricultural and urban areas has the potential to increase pollutant loads such as pesticides, effluent and hydrocarbons. An increase in these pollutants may lead to decreased water quality. The condition of riparian vegetation can influence this aspect, along with rainfall intensity and duration.</li> </ul>
	<b>Introduced species</b>	<ul style="list-style-type: none"> <li>• Mary River cod are potentially threatened by either exotic fish species or fish native from other parts of Australia. The golden perch (<i>Macquaria ambigua</i>) is an Australian species with very similar habits to Mary River cod, and therefore has the potential to compete for food and habitat, reducing the survival of Mary River cod (Simpson 1994; Wager and Jackson, 1993 in Simpson &amp; Jackson 2000).</li> </ul>
	<b>Other threats</b>	<ul style="list-style-type: none"> <li>• Mary River cod occur in small, isolated populations due to the restriction of habitat availability across the Mary River catchment and are therefore at risk from other potential threats including disease, the loss of genetic variability, and inbreeding. The intrinsic biology of this species is likely to have prevented its recovery from the low population levels caused by habitat alteration and overfishing (Rowland, 1993 in Simpson &amp; Jackson 2000).</li> </ul>

## 2.3 White-throated Snapping Turtle

The white-throated snapping turtle (*Elseya albagula*), also known as the southern snapping turtle, is a cloacal ventilating, short-necked freshwater turtle. It is the largest species of snapping turtle and among the largest short-necked turtles, with the female shells growing to 38cm long (TSSC, 2014). They have a large head, though the males are notably smaller than females. Females can also be distinguished by a white face and neck, while the juveniles and hatchlings are characterised by strongly serrated shell margins (TSSC, 2014). The serration of the carapace in juveniles, shape of the head and white markings were among the main features that distinguished this species from the northern snapping turtle (*Elseya dentate*) which it was previously recognised as until 2006 (Thomson, *et al* 2006).

The white-throated snapping turtle is a herbivore that feeds on a variety of aquatic plants, fallen fruits and on occasions, aquatic insects and molluscs (EHP, 2011). Breeding occurs between autumn and winter (May to July) (Limpus, 2008), with hatchlings emerging from the shallow nests between December and January (EHP, 2011 and Thomson *et al* 2006). The incubation period for this species is estimated to be 24 weeks with one clutch per year (Thomson *et al* 2006). The average clutch size in Hamann *et al* (2004) was 14, though this is dependent on food availability.

Studies have found this species to be a slow growing turtle, reaching sexual maturity and first breeding between 15-20 years of age (Hamann *et al* 2004, Limpus 2008, Limpus *et al* 2011). Males may reach maturity slightly earlier than females.

### 2.3.1 Conservation Status

The white-throated snapping turtle was listed as critically endangered under the EPBC Act on 20 October 2014. Prior to this date, it was not recognised as threatened, likely as a result of limited understanding of the species and its distribution. The species is currently listed as Least Concern in Queensland under the NC Act, though it is ranked as a high priority under the EHP *Back on Track species prioritisation framework*.

The Conservation Advice (TSSC, 2014) for the white-throated snapping turtle identifies all populations within the Mary, Burnett and Fitzroy catchments as “important populations” for the purpose of significant impact assessments. Furthermore, important habitat for the survival of the species is described as all in-stream and adjacent banks within approximately 50m, in areas identified as suitable habitat.

### 2.3.2 Distribution

The white-throated snapping turtle is endemic to south eastern Queensland, found only in the Fitzroy, Mary and Burnett Rivers and associated smaller drainages lines (TSSC, 2014). In the Mary River, this species has been reported to occur from the freshwater limits of the lower catchment within the Mary River Barrage, up to Kenilworth in the upper catchment (Limpus, 2008).

### 2.3.3 Habitat requirements

The white-throated snapping turtle prefers clear, well-oxygenated flowing waters in which shelter and refuge are available, including rocky beds and undercut banks (EHP, 2011 and TSSC, 2014). As it is a specialised cloacal ventilating turtle, the oxygen levels are an important requirement for this species (Limpus *et al* 2011). Within the Fitzroy, Mary and Burnett Rivers it is known to occupy the permanent waters of the uppermost spring-fed pools to the freshwater-brackish water interface (Hamann *et al* 2004). Thomson, Georges and Limpus (2006) noted that brackish waters are unsuitable for this species and they are rarely found in standing waters such as dams or weirs.

Nesting habitat does not appear to be specific, with soil types ranging from sandy to dark clay/loam. Many nests are reported to be laid on the upper edge of steep slopes on average at a distance of 16.6m away from the water's edge, though this may vary up to 86m from the water's edge (Hamann *et al* 2004, Limpus *et al* 2011).

### 2.3.4 Existing Threats and impacts

A review of existing reports and studies identified several existing threats to the white-throated snapping turtle. Key threats include loss of eggs and hatchlings to predators from nesting areas, habitat degradation, reduction in water quality and recreational fishing. Each of the key threats and associated impacts to the species are described in further detail in Table 4.

Threats to the white-throated snapping turtle are similar to those of the Mary River turtle. The construction of dams and weirs may impact turtles through a range of avenues, including removal of riparian vegetation, impoundments (thereby preventing flow of water) and subsequent issues with water quality, such as poor oxygen and altered hydrology.

**Table 4: Existing threats and impacts to the white-throated snapping turtle**

Threat	Impacts
<b>Nest disturbance</b>	<ul style="list-style-type: none"> <li>The main threat to the white-throated snapping turtle is the loss of eggs and hatchlings to predators from nesting areas (Hamann <i>et al</i> 2007, Limpus <i>et al</i> 2011). Known predators include foxes, dogs, cats, pigs, lizards (monitors) and water rats. Additionally, tramping of nests by cattle has been documented (TSSC, 2014).</li> </ul>
<b>Habitat degradation</b>	<ul style="list-style-type: none"> <li>The construction of impoundments along watercourses in its range has degraded and reduced the available habitat for the white-throated snapping turtle (TSSC, 2014). Additionally, construction of dams and weirs has been highlighted as a threat due to creation of barriers, isolation of populations, changes to hydrology and direct removal of suitable habitat (EHP, 2011).</li> <li>Adult mortality and damage also occur as a result of overtopping of dams and weirs (Hamann <i>et al.</i> 2007; Limpus <i>et al.</i> 2011).</li> <li>The invasion of aquatic weeds in watercourses and along the banks may interfere with nesting habitat (Limpus <i>et al</i> 2011).</li> <li>Studies have identified natural droughts and drying of waters through other means, including extraction for agriculture as a threat through alteration of hydrology and direct removal of suitable habitat (Limpus <i>et al</i> 2011). This is particularly the case given that agriculture is significant across the Mary River catchment.</li> <li>One study has suggested that water level fluctuations may have significant impacts on availability of food resources with cascading effects on food web dynamics (Tucker <i>et al.</i> 2012).</li> </ul>

Threat	Impacts
Recreational Fishing	<ul style="list-style-type: none"> <li>• Limpus <i>et al</i> 2011 identified recreational fishing as a less significant impact to the white-throated snapping turtle. Impacts to the species occur indirectly through stocking of dams or introduction of predators and directly through being caught on fishing lines with hooks in their mouths and throats.</li> <li>• Boat strike causes turtle injury and mortality in some areas of navigable waterways (EHP, 2011).</li> </ul>
Reduced water quality	<ul style="list-style-type: none"> <li>• Turtles that rely on cloacal respiration (i.e. <i>Elusor</i> and <i>Eelseya</i> species) are disadvantaged in stratified, low-oxygenated, turbid water in impoundments (Tucker, 2000).</li> </ul>

### 3. Habitat Suitability Assessment

This section provides a summary of previous studies, investigations and research undertaken within the Project area to determine the suitability of habitat for the Mary River turtle and the Mary River cod. A number of terrestrial and aquatic field assessments have been completed for the Project during the Preliminary Design and Detailed Design phases. A description of each previous investigation undertaken to date is described below to assist in the identification of potential downstream impacts on these species and their habitat. Due to the specific habitat requirements of both the Mary River turtle and Mary River cod requiring waterway characteristics typical of permanent waterways the investigations described below focus on the four main waterways intersected by the Project. These include Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek.

Although not specifically targeted during previous field surveys, the white-throated snapping turtle was not encountered during these investigations. Furthermore, based on the review of available literature, the habitat preferences and characteristics of the Mary River turtle were considered to be similar to that of the white-throated snapping turtle (e.g. cloacal ventilators, preference for oxygenated flowing waters).

Pre-construction water quality monitoring at locations upstream and downstream of the proposed work areas is currently being undertaken by the MRCCC on behalf of TMR to provide background water quality data for the Project prior to construction commencing. Interim reporting results from this monitoring program are anticipated to be available in late 2015.

#### 3.1 Desktop Assessment

##### 3.1.1 EPBC Act Protected Matters Search Tool

Several searches utilising the EPBC Act Protected Matters Search Tool were undertaken for this Project including:

- The entire alignment from Traveston to Woondum with a 5km buffer applied
- Traveston Creek point search with a 1km buffer applied
- Kybong Creek search with a 1km buffer applied
- Cobbs Gully with a 1km buffer applied
- Jackass Creek with a 1km buffer.



The following freshwater aquatic species were identified in the 5km buffer search as potentially occurring or known habitat occurring in the search area:

- Mary River cod, listed as 'endangered' under the EPBC Act
- Mary River turtle, listed as 'endangered' under the EPBC Act
- Australian lungfish, listed as 'vulnerable' under the EPBC Act
- White-throated snapping turtle, listed as 'critically endangered' under the EPBC Act.

A search with a 1km buffer applied to each of the proposed waterway crossing structures listed above only identified the Mary River turtle.

A copy of the search results are included in Appendix A.

## 3.2 Results of Field Assessments

### 3.2.1 Traveston Creek

#### 3.2.1.1 Stream Morphology

Traveston Creek flows west to the Mary River, and is categorised as a lowland freshwater stream in accordance with the *Environmental Protection (Water) Policy 2009 Mary River Environmental Values and Water Quality Objectives Basin no 138 Including all Tributaries of the Mary River* (DERM, 2010). Traveston Creek flows in a north westerly direction crossing existing Bruce Highway at the Old Traveston Road intersection before converging with Mary River and continuing in a north westerly direction parallel to the existing highway. The Project area crosses Traveston Creek approximately 3km upstream of the confluence with the Mary River. Where the proposed alignment crosses Traveston Creek the waterway is mapped on the Department of Natural Resources and Mines' (NRM) regulated regrowth mapping (version 2.1) as a third order stream.

An assessment of stream morphology was undertaken in April 2015 by SMEC (2015c) and included the area where the alignment crosses Traveston Creek and at points approximately 100 m and 200 m downstream of the crossing point. The results of the assessment are provided in Appendix B . Traveston Creek was considered a permanent waterway with intermittent flows, clearly defined bed and banks bordering intact native riparian vegetation and cleared grazing land along some sections (Jacobs SKM, 2014 and SMEC, 2015c). The channel habitat is composed of a meandering run with wider and deeper pooled sections. It has two channels which merge into one approximately 75m upstream of the proposed crossing (Jacobs SKM, 2014 and SMEC, 2015c), during periods of heavy rainfall there is a high degree of meandering at the proposed crossing location due to the converging of tributaries upstream of this location. Approximately 175m upstream of the Project area, Traveston Creek flows through a culvert under Old Traveston Road. Within the Project area, Traveston Creek comprises a meander with a deep pool section as shown in Plate 1.

Field surveys were undertaken by Jacobs SKM between January and May 2012 as part of an aquatic ecological assessment. Surveys were concentrated around the proposed crossing location and upstream and downstream of this point (approximately 50 m of reach in total) (Jacobs SKM, 2014). This assessment found this section of Traveston Creek to be comprised of run and pool natural channel habitats, with a mean channel width of between 3.5 – 5.5m and a maximum depth of between 1.3 – 2.2m (Jacobs SKM, 2014). The mean channel width at the proposed crossing location is 4m, while the maximum depth was found to be 1.3m. The dominant substrate of the waterway was found to be silt with a low substrate complexity due to the presence of a single contiguous substrate. The wetted width of the area upstream of the proposed crossing structure at the time of investigation was 7.0m with a bankfull width of 24m. Whereas, the wetted width of the area downstream of the proposed

crossing structure at the time of investigation was 2.2m with a bankfull width of 5.5m (Jacobs SKM, 2014).



**Plate 1: Downstream (left) and upstream (right) of the crossing point on Traveston Creek**

### 3.2.1.2 Water Quality

The MRCCC coordinates a long-term water quality monitoring program across the Mary River Catchment which includes two sites along Traveston Creek (MRCCC, 2013). The two sites are located within Traveston Creek adjacent to Old Traveston Road and Traveston Crossing Road. The 2013 annual report card produced by MRCCC reported on the results of waterway quality monitoring, Table 5 below shows the median values recorded for each parameter recorded during this monitoring program. Water quality values were compared against the most locally relevant water quality objectives (WQOs) and guidelines for protection of aquatic ecosystems in slightly to moderately disturbed environments as defined in the *Environmental Protection (Water) Policy 2009 Mary River environmental values and water quality objectives Basin no 138 including all tributaries of the Mary River*. The WQOs are shown in column 1 of Table 5 and were used for comparison to median water quality characteristics observed during the long term water quality monitoring.

**Table 5: Long term water quality monitoring (MRCCC, 2013)**

Parameter	Water quality objective	Traveston Creek Old Traveston Road	Traveston Creek Traveston Crossing Road
pH	6.5 – 8.0	7.01	7.41
Turbidity (NTU)	<50NTU	17	7
Total suspended solids (mg/L)	<6mg/L	ND*	ND*
Dissolved oxygen (%sat)	85 – 110% saturation	<b>40</b>	<b>36</b>
Electrical conductivity ( $\mu\text{S cm}^{-1}$ )	626	<b>698</b>	<b>1453</b>

\*ND – No data

Note – **Bold** water quality results fall outside the water quality objectives

The results of the long term water quality data indicated that majority of the above parameters were within the recommended water quality objectives for this waterway besides electrical conductivity and dissolved oxygen. Water quality parameters are likely to be variable across seasonal variability, periods of flood and extended periods of dry events. The variability of water quality characteristics is also likely to influence the activities of numerous aquatic organisms within the waterway.

### 3.2.1.3 Aquatic Ecology

At the location of the proposed crossing of Traveston Creek, the waterway was found to have an approximate continuous reach of 500 metres between the upstream culvert on Old Traveston Road and the first of two downstream culverts (Jacobs SKM, 2014). An assessment of the aquatic habitat characteristics within Traveston Creek was also undertaken as part of this assessment to assess whether the waterway contains habitat characteristics required to support threatened aquatic species, including the Mary River cod and the Mary River turtle. This assessment found Traveston Creek to be a highly disturbed aquatic environment due to high levels of siltation, extensive macrophyte beds, low dissolved oxygen concentrations, ponding, reduced connectivity as a result of existing road culverts and the presence of dissolved toxic heavy metals (Jacobs SKM, 2014). Due to the low connectivity, existing in-stream barriers, high levels of siltation observed and the water quality characteristics of Traveston Creek habitat values within this waterway were assessed as unlikely to provide habitat for the Mary River cod or the Australian lungfish and highly unlikely to provide habitat for the Mary River turtle (Jacobs SKM, 2014) due to the absence of sand banks. It may provide marginal habitat for the white-throated snapping turtle as there is flowing water, though the instream barriers and low dissolved oxygen suggest they are unlikely to occur.

SMEC concluded in 2015 that the survey area supported marginal habitat for conservation significant species. 'Marginal habitat' was defined as that which could be utilised by the target species (e.g. as foraging habitat) on a temporary basis under certain conditions (e.g. elevated flows) but is not considered to support features that are considered essential (e.g. breeding sand banks for Mary River turtle or deep pools for Mary River cod) for the continued viability of the target species at a local or regional scale (SMEC, 2015c). Aquatic fauna sampling was undertaken via backpack electrofishing and five fyke netting attempts within Traveston Creek in 2012 by Jacobs SKM (Jacobs SKM, 2014). This sampling event did not identify any small bodied fish within the water, nor did this sampling event return any species of large bodied fish or turtles (Jacobs SKM, 2014) even though large deep pools were present.

The longitudinal aquatic habitat assessment (Jacobs SKM, 2014) found that Traveston Creek had an average rating of 46% which represents a waterway in 'fair to good' condition (100% representing an undisturbed waterway). Bank stability scored in the 'good' range and bank vegetative cover and streamside cover were in the 'fair to good' range. A high degree of siltation was present which resulted in a low score for this assessment criterion.

Survey results of instream connectivity found that fish movement is impeded both upstream and downstream of the creek crossing. A farm dam is located approximately 120m upstream of the proposed works, with a culvert under Old Traveston Road approximately 175m upstream of the Project area. A three metre high concrete weir and collapsed culvert is located approximately 300m downstream (refer Plate 2). A culvert crossing under the existing Bruce Highway is located approximately 500m downstream. Culverts are also located upstream beneath Traveston Road and a private access road and downstream beneath the existing Bruce Highway. The survey found that these structures presented significant barriers to fish passage, particularly during times of low flow.

Furthermore, the presence of instream barriers (refer Section 3.2.1.4) would impede the upstream migration of Mary River cod in low flow scenarios, and to a lesser extent the Mary River turtle and white-throated snapping turtle, to the reach of Traveston Creek within the Project area. This section of Traveston Creek was also observed to be subjected to considerable sedimentation as a result of the historic removal of riparian vegetation and bank erosion (refer to Plate 2) which further degrades the quality of the reach as habitat for the target species.





**Plate 2: Erosion occurring upstream of the Project area on Traveston Creek**

### 3.2.1.4 Instream Barriers

The following existing barriers are present along this section of Traveston Creek (Jacobs SKM, 2014 and SMEC, 2015c):

- Road culvert (low flows) on Old Traveston Road (upstream)
- Road culvert on unnamed rural road (downstream) (refer Plate 3)
- Road culvert on the existing Bruce Highway (downstream)
- Concrete weir (approximately 3m high) (downstream) (refer Plate 3)

These barriers inhibit fish migration along this section of Traveston Creek, particularly during periods of low flow (Jacobs SKM, 2014).



**Plate 3: Collapsed road culvert downstream (left) and concrete weir located downstream (right) of the crossing point on Traveston Creek**

### 3.2.1.5 Riparian Vegetation

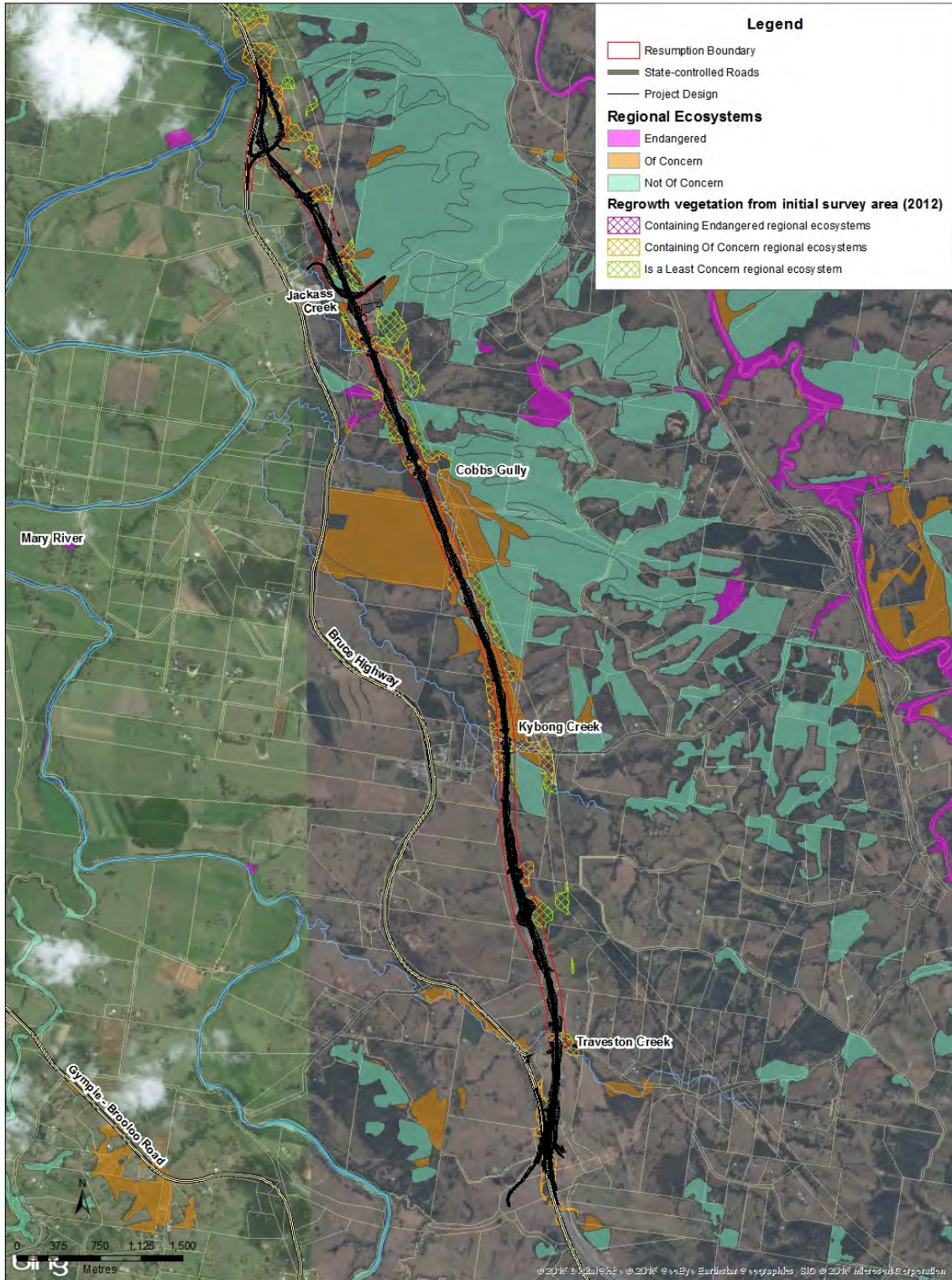
The field survey undertaken by Jacobs SKM in 2012 noted that Traveston Creek is bordered by vegetation consistent with Regional Ecosystem (RE) 12.3.11 Of Concern, described on the Regional Ecosystems Description Database (REDD) as *Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near the coast, refer to Figure 2 (Jacobs SKM, 2014).

Riparian vegetation along Traveston Creek was observed to have been significantly impacted as a result of canopy fragmentation and land clearing for agriculture. An estimated riparian vegetation canopy cover of 40% now remains within the Project area.

### 3.2.1.6 Soils

Soil types throughout the Project area are broadly described as clay loam or light to medium clay with a low infiltration capacity (Jacobs SKM, 2014). Additional geotechnical testing was undertaken at Traveston Creek during the Detailed Design phase (SMEC, 2015a). Testing confirmed alluvium clayey soils at Traveston Creek. Analysis of soil erodibility, using Emerson class testing, was carried out on three test pits, and all samples recorded a score of 1, which indicates that highly erodible soils are present. These results are notably similar to conditions recorded along the alignment by investigations undertaken during preparation of the REF (Jacobs SKM, 2014).





PROJECT NO. 30031298	SKETCH SK-1298-0202	ISSUE 01
PROJECT TITLE Cooroy to Curra (Section C)	CREATED BY KM11809	DATE 29/05/2015 Time: 4:55:34 PM
COORDINATE SYSTEM GDA 1994 MGA Zone 56	SOURCE QLD Govt, SKM, SMEC, BING	Copyright SMEC Australia Pty Ltd. All Rights Reserved. © State of Queensland (Department of Natural Resources and Mines) 2014. Updated data available at <a href="http://dds.information.qld.gov.au/dds/">http://dds.information.qld.gov.au/dds/</a>
PAGE SIZE A3	SCALE	  CONSULTANT SMEC Australia

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**Figure 2: Mapped regional ecosystems in the Project area**

Attachment 2: Bruce Highway (Cooroy to Curra) Upgrade Section C (Traveston Road to Keefton Road) Project Job No. 232/10A/2 – Impact Assessment and Erosion and Sediment Control Plan – Mary River Turtle, Mary River Cod and White-throated Snapping Turtle



## 3.2.2 Kybong Creek

### 3.2.2.1 Stream Morphology

Kybong Creek flows in a north westerly direction, crossing under the existing Bruce Highway, before converging with Mary River. Where the proposed alignment crosses Kybong Creek the waterway is mapped on the NRM's regulated regrowth mapping (version 2.1) as a second order stream.

An assessment of stream morphology was undertaken in April 2015 by SMEC (2015b) (summarised in Appendix B). This included the location of the proposed new bridge over Kybong Creek, and at locations approximately 100m and 200m downstream of the crossing point. Kybong Creek is considered to be a semi-permanent, highly modified waterway with defined bed and banks characterised by a meandering course comprised of a series of shallow disconnected channel pools (refer Plate 4). During low flow periods, the creek has no continuous runs, however after rainfall the creek flows continuously. The stream morphology of Kybong Creek at the proposed structure crossing is characterised by a crescent shaped bend which meanders back upon itself (Jacobs SKM, 2014). Furthermore, at the crossing point, the channel has been modified into a pool formation, with decking installed along the bank, as shown in Plate 4. This stretch of Kybong Creek is fed by two independent tributary branches (first and second order streams) that converge to form one channel directly upstream from the proposed alignment, which is likely to contribute to the meandering nature of the waterway at this location.

Field surveys were undertaken by Jacobs SKM between January and May 2012 as part of an aquatic ecological assessment. Surveys were concentrated around the proposed crossing location and upstream and downstream of this point (approximately 50m of reach in total) (Jacobs SKM, 2014). This assessment found that upstream of the proposed crossing location the natural channel habitat of Kybong Creek is comprised of runs and riffles, while habitats at the crossing location and downstream of the crossing consists of a series of short runs and shallow pools (Jacobs SKM, 2014). The mean channel width upstream of the crossing was found to be 1.2m wide with a maximum depth of 0.5m, while the mean channel width at the crossing and downstream of the crossing was found to be 0.9m wide with a maximum depth of 0.7 – 0.9m deep (Jacobs SKM, 2014).

Upstream of the site, Kybong Creek and its tributary pass under Tandur Road, approximately 180m and 500m respectively. Downstream, Kybong Creek passes under the existing Bruce Highway approximately 2.4km from the Project area. These culverts present a barrier to fish passage, particularly during periods of low flow. Fish passage is also limited by upstream and downstream dams, located upstream south of Tandur Road, and approximately 100m downstream.



**Plate 4: Upstream (left) and artificial deep pool habitat and decking downstream (right) of the crossing point on Kybong Creek**

### 3.2.2.2 Water Quality

A single water quality monitoring event was undertaken during August 2012 (Jacobs SKM, 2014) upstream and downstream of the proposed crossing location. At the time of monitoring Kybong Creek was in flow (Jacobs SKM, 2014). Water quality values were compared against the most locally relevant WQO and guidelines for protection of aquatic ecosystems in slightly to moderately disturbed environments, as defined in the *Environmental Protection (Water) Policy 2009 Mary River environmental values and water quality objectives Basin no 138 including all tributaries of the Mary River*. The WQO's are shown in column 2 of Table 6 and were used for comparison to the water quality results observed during this sampling event.

**Table 6: One-off water quality sampling (Jacobs SKM, 2014)**

Parameter	Water quality objective	Kybong Creek upstream	Kybong Creek downstream
pH	6.5 – 8.0	7.4	7.3
Turbidity (NTU)	<50NTU	2.6	5.2
Total suspended solids (mg/L)	<6mg/L	ND	3
Dissolved oxygen (%sat)	85 – 110% saturation	<b>82.2</b>	<b>67.4</b>
Electrical conductivity ( $\mu\text{S cm}^{-1}$ )	626	475	<b>754</b>

\*ND – No data

Note – **Bold** water quality results fall outside the water quality objectives

The results from the one off sampling event indicated that majority of the above parameters were within the recommended water quality objectives for this waterway except electrical conductivity and dissolved oxygen. Water quality parameters are likely to be variable across seasonal variability, periods of flood and extended periods of dry events. The variability of water quality characteristics is also likely to influence the activities of numerous aquatic organisms within the waterway.

The REF concluded that the results indicate that the quality of water represents a risk to aquatic ecosystem health and does not maintain the protection level for slightly to moderately disturbed watercourses for the Mary River catchment (Jacobs SKM, 2014).

### 3.2.2.3 Aquatic Ecology

An assessment of the aquatic habitat characteristics within Kybong Creek was undertaken to assess whether the waterway contains characteristics required to support threatened aquatic species (Jacobs SKM, 2014). This assessment found that Kybong Creek supported very limited habitat for turtle and fish species due to the shallow nature of pools present, the limited length in runs between pools and the amount of siltation present and various existing instream barriers upstream and downstream of the proposed crossing location (Jacobs SKM, 2014), refer to Plate 5. Electrofishing was undertaken during the field investigation, no fish were observed or captured within monitoring locations upstream or downstream of the proposed crossing location on Kybong Creek (Jacobs SKM, 2014). Two native fish species (*Hypseleotris* spp. and *Mogurnda adspersa*) were observed within the monitoring location within the upstream tributary to Kybong Creek (SKM Jacobs, 2014).

A subsequent investigation of the area of the proposed creek crossing and at points approximately 100m and 200m downstream was undertaken by SMEC in April 2015 (SMEC, 2015b). The aim of the survey was to assess the potential habitat for threatened freshwater aquatic species within Kybong Creek. Suitable habitat for the Mary River cod and Mary River turtle was not observed during the survey and is expected to be uncommon at this location due to its position high in the catchment area. There are no known records of these species within the survey area and numerous instream stream

barriers to fish movement occur within the immediate area. Therefore SMEC concluded that the survey area could be described as comprising marginal habitat for the Mary River cod and the Mary River turtle.

A review of this data for the white-throated snapping turtle found that the instream barriers observed would inhibit movement of this species. Kybong Creek is therefore likely to provide marginal to no suitable habitat for the white-throated snapping turtle and as such, the species is not expected to occur at this location.

#### 3.2.2.4 Instream Barriers

During the aquatic surveys undertaken both by Jacobs SKM (2014) and SMEC (SMEC, 2015b) an assessment of the connectivity of the waterway was undertaken which identified the number and nature of existing in-stream barriers to fish movement. Kybong Creek was found to be a semi-permanent, highly disturbed waterway which is located through partly cleared native forest with pool habitats and no continuous runs (Jacobs SKM, 2014 and SMEC, 2015b). The following existing barriers are present along this section of Kybong Creek. These barriers inhibit fish movement along this section of Kybong Creek, particularly during periods of low flow (Jacobs SKM, 2014):

- Farm dam (upstream)
- Tandur Road culverts (180m and 500m upstream)
- Farm dam (downstream)
- Man-made instream barrier (100m downstream, refer Plate 5)
- Road culvert on the existing Bruce Highway (2.4km downstream)



**Plate 5: Fragmented pool habitat (<50cm deep) (left), instream barrier to fish movement (right)**

#### 3.2.2.5 Riparian Vegetation

The field survey undertaken by Jacobs SKM in 2012 noted that Kybong Creek is bordered by vegetation consistent with RE 12.3.11 Of Concern, described on the REDD as *Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near the coast, shown in Figure 2 (Jacobs SKM, 2014).

#### 3.2.2.6 Soils

The soil types throughout the Project area can broadly be described as clay loam or light to medium clay with a low infiltration capacity (Jacobs SKM, 2014). Habitat assessments undertaken by SMEC during 2015 identified the dominant substrate of Kybong creek as cobble/ sand and bedrock/ cobble/



gravel/ sand/ silt. Geotechnical investigations undertaken as part of the preliminary design (Jacobs SKM 2014) identified the soils approximately 10m to the east of the Kybong Creek crossing point as consisting of a topsoil layer of gravelly silt (to 0.18m), underlain by residual soils of sandy clay (0.18m to 1.2m) and gravelly clay – siltstone (to 2.5m).

### **3.2.3 Cobbs Gully**

#### **3.2.3.1 Stream Morphology**

Where the proposed alignment crosses Cobbs Gully the drainage line is mapped on NRM's regulated regrowth mapping (version 2.1) as a second order stream. Cobbs Gully flows in a north westerly direction crossing the existing Bruce Highway before intersecting with Kybong Creek before converging with the Mary River and continuing in a north westerly direction. Cobbs Gully is a highly modified, wide ephemeral drainage line flowing through terrestrial and non-native vegetation (Jacobs SKM, 2014). The drainage line lacks characteristics of a permanent waterway with the absence of defined bed and banks, concentrated flow and minimal instream macrophytes. The drainage line is considered to provide low connectivity, intermittent flows and supports a large permanent dam upstream of the crossing location, with a small number of permanent pools present downstream of the crossing location (Jacobs SKM, 2014 and SMEC, 2015d) (refer to Appendix B). An existing manmade dam is present upstream of the crossing location and a bund wall has diverted the natural flow path of the main channel (Jacobs SKM, 2014). Two small drainage lines (first and second order streams) converge further upstream of the proposed crossing location, these are located upstream of an existing dam. Due to the wide ephemeral nature of Cobbs Gully a series of overland flow paths lead to the primary waterway from a number of directions within the immediate catchment. Furthermore, an additional minor tributary (first order stream) intersects Cobbs Gully downstream of the proposed crossing location contributing to the flow of the waterway.

Field surveys were undertaken between January and May 2012 as part of an aquatic ecological assessment by Jacobs SKM and in April and May 2015 by SMEC (2015d) (refer Appendix B for the survey results). Surveys were concentrated around the proposed crossing location and upstream and downstream of this point (approximately 50m of reach in total) (Jacobs SKM, 2014). Jacobs SKM found this section of Cobbs Gully to be comprised of 100 % run habitats, with a mean channel width of between 1.2m and 1.5m and a maximum depth of between 0.9m and 1.2m (Jacobs SKM, 2014). At the time of the survey completed by SMEC, this section of Cobbs Gully comprised a series of shallow pools and glides with an average depth of 0.5m (refer to Appendix B for survey results).

During both assessments Cobbs Gully was observed to lack defined bed and banks with an approximate wetted width of 0.50m (upstream) and 0.60m (downstream) (Jacobs SKM, 2014 and SMEC 2015d, Appendix B). The riparian vegetative cover present was approximately 60% both upstream and downstream of the proposed crossing structure (Jacobs SKM, 2014 and SMEC, refer to Appendix B).

#### **3.2.3.2 Water Quality**

Initial water quality monitoring conducted as part of preparation of the REF found that at the time of sampling in August 2012, Cobbs Gully was not flowing. Results for turbidity, dissolved aluminium and copper exceeded the nominated water quality guideline values at the upstream and downstream sampling locations. Results for total suspended solids exceeded guideline values at the upstream sampling location. The REF concluded that the results indicate that the quality of water represents a risk to aquatic ecosystem health and does not maintain the protection level for 'slightly to moderately disturbed watercourses' for the Mary River catchment (Jacobs SKM, 2014).



### 3.2.3.3 Aquatic Ecology

A longitudinal aquatic habitat assessment of the waterway concluded that Cobbs Gully had an average rating of 44%, which represents a site in fair condition (Jacobs SKM, 2014). Scores for individual habitat criteria varied, with poor results recorded for embeddedness, velocity/depth, bottom substrate and pool/riffle/bend ratio. Bank stability scored 'good' with a result of 70% and streamside cover scored 60%, representing a 'fair-good' condition.

Aquatic fauna sampling was undertaken via backpack electrofishing within Cobbs Gully in 2012 by Jacobs SKM (Jacobs SKM, 2014). This sampling event recorded a single carp gudgeon (*Hypseleotris* sp.), a single purple-spotted gudgeon (*Mogurnda adspersa*) and nine mosquito fish (*Gambusia holbrooki*) (Jacobs SKM, 2014). The sampling effort did not return any species of large bodied fish or turtles as no large deep pools were present.

Suitable habitat for the Mary River turtle and Mary River cod was not observed during the aquatic surveys completed by SMEC (refer Appendix B) and is expected to be uncommon at this location due to its position high in the catchment. The waterway did not contain any sandbanks, riffles, deep pools and has poorly oxygenated water. Shallow pools and large woody debris was present. In this regard, it was concluded that the survey area could be described as comprising marginal habitat for these species.

A review of this assessment was undertaken for the white-throated snapping turtle and concluded that given the habitat requirements, the waterway is also considered to comprise marginal habitat conditions for this species.

### 3.2.3.4 Instream Barriers

Survey results of instream connectivity found that Cobbs Gully has low connectivity due to extended periods of dry conditions and the presence of existing upstream barriers (Jacobs SKM, 2014). The following existing barriers are present along this section of Cobbs Gully. These barriers, in addition to the dry nature of the drainage line inhibit the likelihood of fish movement along this section of Cobbs Gully (Jacobs SKM, 2014).

- Large manmade dam with a bund wall which has realigned the natural flow of the main channel (upstream)
- Constructed dam (downstream)
- Road culvert under the existing Bruce Highway (downstream).

Cobbs Gully was observed to consist of a series of disconnected sections of channelled pool habitat, each approximately 40m in length and shallow in nature (less than 0.7m deep) (Jacobs SKM, 2014). The disconnected sections of channels, the presence of several downstream barriers and shallow depth of this waterway were considered likely to limit the habitat suitability of this waterway to smaller fish species tolerant of degraded habitats (Jacobs SKM, 2014). Waterway characteristics are shown in Plate 6 and Plate 7.



**Plate 6: Woody debris at Cobbs Gully (left) and evidence of disconnected channels (right)**



**Plate 7: Riparian vegetation at Cobbs Gully**

### 3.2.3.5 Riparian Vegetation

Field survey undertaken by Jacobs SKM in 2012 verified that at the location where the alignment crosses Cobbs Gully, the waterway is bordered by vegetation consistent with RE 12.11.3 described on the REDD as *Eucalyptus siderophloia*, *E. propinqua* +/- *E. microcorys*, *Lophostemon confertus*, *Corymbia intermedia*, *E. acmenoides* open forest on metamorphics +/- interbedded volcanics (Jacobs SKM, 2014) (refer to Figure 2). As shown on Figure 2, areas of mapped Of Concern RE 12.3.11 are also located upstream of the Project area.

### 3.2.3.6 Soils

According to the REF (Jacobs SKM, 2014) soil types throughout Project area can broadly be described as clay loam or light to medium clay with a low infiltration capacity (Jacobs SKM, 2014). During field investigations undertaken by SMEC (2015d) the dominant substrate of the upstream section of the drainage line was found to be silt with a low substrate complexity as a single contiguous substrate while the downstream the dominant substrate of the drainage line comprised a mix of bedrock, cobble, gravel, sand and silt (Jacobs SKM, 2014 and SMEC 2015d).

## 3.2.4 Jackass Creek

### 3.2.4.1 Stream Morphology

Where the Project area crosses Jackass Creek the waterway is mapped on the NRM's regulated regrowth mapping (version 2.1) as a second order stream. Jackass Creek flows in a north westerly direction crossing the existing Bruce Highway directly east of the Woondum State Forest and north of

Mullaly Road, converging with the Mary River and continuing in a north westerly direction parallel to the highway.

An assessment of stream morphology was undertaken by Jacobs SKM in 2014 and SMEC in 2015 (refer to Appendix B for survey results) and included the Project area and at locations approximately 100m and 200m downstream of the crossing point. Jackass Creek was observed to be a semi-permanent waterway with clearly defined bed and banks running through mostly cleared land with abundant non-native ground cover (Jacobs SKM, 2014). Jackass Creek is the central waterway across this section of the landscape formed by a number of smaller ephemeral drainage lines which eventually feeds into the Mary River. Field surveys undertaken by Jacobs SKM were undertaken between January and May 2012 as part of an aquatic ecological assessment. During this field assessment Jackass Creek was flowing and was observed to be comprised of a series of long runs and shallow pools, with a mean channel width of between 1.2m and 1.8m and a maximum depth of between 0.6m and 0.9m (Jacobs SKM, 2014). The wetted width during the field survey was 0.22m (upstream) and 2.2m (downstream).

#### 3.2.4.2 Aquatic Ecology

This section of Jackass Creek was found to be comprised of long sections of approximately 40m long disconnected shallow channelled pool habitat (approximately 1m deep) (Jacobs SKM, 2014). The field observations undertaken by Jacobs SKM during 2012 found that the hydrological alteration from in-stream barriers along this waterway has resulted in reduced low flows, ponding in channels upstream of existing barriers and increased siltation (Jacobs SKM, 2014). Due to the aforementioned habitat values Jackass Creek was assessed as unlikely to provide habitat for the Mary River turtle or other large bodied conservation significant freshwater species (Jacobs SKM, 2014). Notwithstanding, aquatic fauna sampling was undertaken via backpack electrofishing within Jackass Creek in 2012 by Jacobs SKM (Jacobs SKM, 2014). This sampling event recorded the presence of *Melanotaenia duboulayi* (rainbow fish), *Tandanus* (freshwater catfish) and *Gambusia holbrooki* (mosquito fish). The recorded presence of freshwater catfish indicates that Jackass Creek may potentially support large native freshwater fish species however the ability for these fish species to move upstream and downstream of this location is likely to be reduced due to the presence of the downstream barriers.

#### 3.2.4.3 Instream Barriers

During the aquatic surveys undertaken in 2012 an assessment of the connectivity of the waterway was undertaken which identified the number and nature of existing in-stream barriers to fish movement (Jacobs SKM, 2014). Jackass Creek was found to be a semi-permanent waterway with clearly defined bed and banks, which provided connectivity assessed as ranging from low to high, due to the presence of existing downstream barriers (Jacobs SKM, 2014). The following existing barriers are present along this section of Jackass Creek:

- Unnamed rural road (upstream)
- Large dam (downstream)
- Road culvert on Woondum Road (downstream)
- Road culvert on the existing Bruce Highway (downstream)

These barriers inhibit fish movement within this section of Jackass Creek, particularly during periods of low flow (Jacobs SKM, 2014).

#### 3.2.4.4 Riparian Vegetation

The field survey undertaken by Jacobs SKM in 2012 verified that Jackass Creek is bordered by vegetation consistent with RE 12.3.11 Of Concern, described on the REDD as *Eucalyptus tereticornis* +/- *Eucalyptus siderophloia*, *Corymbia intermedia* open forest on alluvial plains usually near the coast,

shown in Figure 2 (Jacobs SKM, 2014). Plate 8 provides a representation of the riparian vegetation present at Jackass Creek.



**Plate 8: Riparian vegetation at Jackass Creek (left and right)**

### 3.2.4.5 Soils

According to the REF soil types throughout the Project area can broadly be described as clay loam or light to medium clay with a low infiltration capacity (Jacobs SKM, 2014). The dominant substrate of Jackass Creek was found to be silt with a low substrate complexity (Jacobs SKM, 2014).

## 3.3 Summary of Habitat Suitability

Table 7 provides a summary of the habitat suitability of each of the major waterways within the Project area based on the specific habitat requirements for the Mary River turtle and Mary River cod. Although not specifically targeted during previous field surveys, the white-throated snapping turtle was not encountered during these investigations. Furthermore, based on the review of available literature, the habitat preferences and characteristics of the Mary River turtle were considered to be similar to that of the white-throated snapping turtle (e.g. cloacal ventilators, preference for oxygenated flowing waters). However, the nesting habitat requirements of the white-throated snapping turtle are poorly understood. Consequently the habitat within the project area described as marginal habitat for the Mary River turtle is also considered to be marginal habitat for the white-throated snapping turtle.

**Table 7: Summary of habitat suitability**

	Traveston Creek	Kybong Creek	Cobbs Gully	Jackass Creek
<b>Mary River turtle and white-throated snapping turtle</b>				
Pools with depth between <1m to >6 m, sand or gravel bottom	Pools present. Maximum depth of between 1.3 – 2.2m.	Shallow pools present 0.5m depth.	Shallow pools present 0.5m depth.	Shallow pools present 0.6m and 0.9m depth.
Microhabitat features including instream woody debris, undercut banks and aquatic vegetation	Instream woody debris present. Macrophyte beds present. Undercut banks.	Instream woody debris present. Undercut banks present.	Instream woody debris present.	Instream woody debris present.



	Traveston Creek	Kybong Creek	Cobbs Gully	Jackass Creek
Sand banks for nesting (Mary River Turtle only)	Absent within Project area.	Absent within Project area.	Absent within Project area.	Absent within Project area.
Vegetated banks for nesting (white-throated snapping turtle only)	Potentially suitable banks within the Project area.	Potentially suitable banks along some sections within the Project area.	Potentially suitable banks along some sections within the Project area.	Potentially suitable banks along some sections within the Project area.
Instream barriers	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.
Favourable water quality, including dissolved oxygen in flowing waters	Dissolved oxygen levels below the water quality objective (MRCCC, 2013).  Sections observed to be perennial.	Dissolved oxygen levels below the water quality objective (Jacobs SKM, 2014).  Sections observed to be perennial.	No data.  Sections observed to be perennial.	No data.  Observed to be perennial.
<b>Outcome of Habitat Suitability</b>	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.
<b>Mary River cod</b>				
Large deep pools with depth between 0.8m to 3.2m, sand or gravel bottom	Pools present. Maximum depth of between 1.3 – 2m.	Shallow pools present 0.5m depth.	Shallow pools present 0.5m depth.	Shallow pools present 0.6m and 0.9m depth.
Riparian vegetation cover	Intact native riparian vegetation.	Riparian zone present downstream of crossing location.	Riparian vegetative cover present 60% cover upstream and downstream.	Riparian vegetative cover present 15 - 25% cover upstream and downstream.

	Traveston Creek	Kybong Creek	Cobbs Gully	Jackass Creek
Microhabitat features including instream woody debris	Instream woody debris present.	Instream woody debris present.	Instream woody debris present.	Instream woody debris present.
Instream barriers	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.	Located upstream and downstream of Project area.
<b>Outcome of Habitat Suitability</b>	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.	<b>Marginal habitat</b> based on the premise that although habitat suitability is low the species could utilise this waterway as foraging habitat during elevated flows.



## 4. Assessment of Impacts

### 4.1 Introduction

An Environmental Risk Assessment (ERA) has been undertaken to identify the potential impacts to the Mary River turtle, Mary River cod and the white-throated snapping turtle as a result of the Project. Furthermore, this assessment is provided to assess the effectiveness of the proposed mitigation and management measures during construction and operation of the Project with consideration of the Mary River turtle and the Mary River cod, in accordance with item (b) of the RFI. This ERA has also been extended to include the white-throated snapping turtle.

The methodology of the ERA has adopted the principles outlined in *Australian Standard AS/NZS 4360:1999 Risk Management and Environmental Risk Management – Principles and Process (Standards Australia, 2000)*, and the risk assessment framework outlined in the DoE's *Environmental Management Plan Guidelines* (2014). Details of the methodology employed is provided in the following section, which involves the following key steps:

- Establish the context for the risk assessment
- Identify environmental risks to the Mary River turtle, Mary River cod and white-throated snapping turtle
- Analyse risks, with mitigation and management measures in place
- Evaluate risks to determine if the level of residual risk is acceptable
- Consider the ERA outcome against the DoE's *Significant Impact Guidelines* (2013).

### 4.2 Risk Assessment Framework

This section evaluates the risk of impacts in accordance with the EPBC Act Environmental Management Plan Guidelines<sup>2</sup> to identify both high risk activities and assess the effectiveness of proposed mitigation and management measures during the construction and operational phases of the Project. The same methodology is then applied to determine the residual risk that is likely to occur, following the implementation of suitable mitigation and management measures.

The guidelines detail individual ratings which are assigned to the likelihood and consequence of each impact, with reference to the criteria below. The ratings of these two factors together determines the final risk rating (refer to Table 8). This risk evaluation method is based on *AS/NZS ISO 31000:2009 Risk management – Principles and guidelines* (Standards Australia 2009) which contains further guidance.

Criteria for the likelihood of impact occurrence:

- Highly likely - is expected to occur in most circumstances
- Likely - will probably occur during the life of the Project
- Possible - might occur during the life of the Project
- Unlikely - could occur but considered unlikely or doubtful

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<sup>2</sup> Department of the Environment (2014) [http://www.environment.gov.au/system/files/resources/21b0925f-  
ea74-4b9e-942e-a097391a77fd/files/environmental-management-plan-guidelines.pdf](http://www.environment.gov.au/system/files/resources/21b0925f-<br/>ea74-4b9e-942e-a097391a77fd/files/environmental-management-plan-guidelines.pdf)

- Rare - may occur in exceptional circumstances

Criteria for the consequence of the impact:

- Minor - minor incident of environmental damage that can be reversed
- Moderate - isolated but substantial instances of environmental damage that could be reversed with intensive efforts
- High - substantial instances of environmental damage that could be reversed with intensive efforts
- Major - major loss of environmental amenity and real danger of continuing
- Critical - severe widespread loss of environmental amenity and irrecoverable environmental damage

**Table 8: Risk Rating Table**

	Consequence				
	Minor (1)	Moderate (2)	High (3)	Major (4)	Critical (5)
Highly Likely (5)	Medium (5)	High (10)	High (15)	Severe (20)	Severe (25)
Likely (4)	Low (4)	Medium (8)	High (12)	High (16)	Severe (20)
Possible (3)	Low (3)	Medium (6)	Medium (9)	High (12)	Severe (15)
Unlikely (2)	Low (2)	Low (4)	Medium (6)	High (8)	High (10)
Rare (1)	Low (1)	Low (2)	Low (3)	Medium (4)	High (5)

### 4.3 Potential Impacts attributable to the Project

Potential threats and impacts to the Mary River turtle, the Mary River cod and the white-throated snapping turtle as a result of the Project have been identified in Table 9. This table only includes those impacts that may potentially arise as a result of the Project, and therefore require consideration in the risk assessment and development of mitigation measures for the Project.

**Table 9: Potential Threats and Impacts**

Potential Impact	Details
<b>Mary River turtle and white-throated snapping turtle</b>	
<b>Habitat loss</b>	Direct loss of marginal habitat as a result of instream construction works at each of the four main waterways, including the construction of temporary and permanent waterway diversions.
<b>Fragmentation of habitat</b>	Temporary fragmentation of marginal habitat as a result of habitat modification at each of the four main waterways.
<b>Degradation of habitat</b>	Degradation of foraging, rearing and nesting habitat as a result of increased downstream sedimentation originating from construction works at each of the four main waterways. Direct removal of riparian vegetation, degradation of remaining riparian vegetation due to edge effects, including weed invasion.

<b>Physiological stress</b>	Physiological stress and impaired capacity for cloacal respiration due to sediments originating from construction works resulting in stratified, low-oxygenated, turbid waters downstream
<b>Reduced water quality</b>	Reduced water quality due to erosion and sedimentation caused by opportunistic cattle accessing waterways as a result of construction works.
<b>Mary River cod</b>	
<b>Habitat loss</b>	Direct loss of marginal habitat as a result of instream construction works at each of the four main waterways, including the construction of temporary and permanent waterway diversions.
<b>Fragmentation of habitat</b>	Fragmentation of habitat as a result of habitat modification at each of the four main waterways.
<b>Degradation of habitat</b>	Direct removal of riparian vegetation, degradation of remaining riparian vegetation due to edge effects, including weed invasion. Loss/degradation of deep pool habitat downstream as a result of sedimentation.
<b>Reduced water quality</b>	Reduced water quality due to erosion and sedimentation caused by works and cattle accessing waterways via construction works at each of the four main waterways. Reduced water quality due to stormwater runoff from the construction works and operation of the Project once constructed.
<b>Restricted movement through waterways</b>	Inhibited fish passage through the works site during construction activities.

## 4.4 Environmental Risk Assessment

Table 10 provides an assessment of the potential impacts to the Mary River turtle, Mary River cod and the white-throated snapping turtle in accordance with the risk assessment framework outlined in Section 4.2. Potential impacts associated with non-Project related activities (i.e. grazing, dam construction) are excluded from this assessment. Furthermore it is demonstrated that all risks identified can be reduced to low or moderate threat levels with the implementation of the mitigation and management measures outlined in Table 10. Therefore residual impacts are not anticipated, and offsets under item (c) in the request for additional information from DoE are not proposed for the Mary River turtle, Mary River cod or the white-throated snapping turtle.

**Table 10: Risk Analysis for Construction and Operational Phases – Mary River turtle, Mary River cod and white-throated snapping turtle**

Activity	Sensitive Receptor	Potential Impact	Mitigating Factors	Pre-mitigation			Mitigation/Management Measures	Post-mitigation		
				Likelihood	Consequence	Inherent Risk		Likelihood	Consequence	Residual Risk
Construction of highway	Riparian vegetation	Loss of riparian vegetation through clearing, degradation, edge effects.	None	4	2	8	The designated construction footprint will be clearly marked. Clearing will not occur outside of the designated clearing zones. Any riparian areas impacted by the works (e.g. for access track construction, diversion works) will be stabilised and revegetated with appropriate riparian species, with appropriate terrestrial and aquatic weed management protocols, in accordance with rehabilitation requirements which will be specified in the Project contract documentation.	2	2	4
	Water quality	Contaminants and/or pollutants spill or leach from the site in to the receiving waterway.	None	3	4	12	As part of the ESCP that will be developed for the Project measures will be implemented to store potential pollutants offsite and/or in bunded storage areas. Spill kits and Material Safety Data Sheets (MSDS) for all chemicals used onsite will be readily available. All machinery used on site will be well maintained to minimise the potential for oil/fuel leaks. All machinery will be refuelled and maintained at least 50m from watercourses or drainage lines.	1	3	3
	Aquatic habitat	Loss or modification of aquatic habitat in addition to that at the point of creek crossings due to diversion and construction footprint.	None	2	3	6	The designated construction footprint will be clearly marked. Clearing will not occur outside of the designated clearing zones. Any areas of aquatic habitat impacted by the works will be rehabilitated rehabilitation requirements which will be specified in the Project contract documentation.	1	2	2
		Increased sediment loading of water can fill in deep pools necessary for rearing Mary River cod downstream.	Distance between the works area and downstream habitat areas	2	4	8	The ESC measures described in Part B of this report will be implemented onsite. This will include adaptive and corrective measures to identify and rectify any failings in the ESC measures to limit the potential of downstream impacts originating from the works area.  The works area will be stabilised and rehabilitated in accordance with	1	3	3

Activity	Sensitive Receptor	Potential Impact	Mitigating Factors	Pre-mitigation			Mitigation/Management Measures	Post-mitigation		
				Likelihood	Consequence	Inherent Risk		Likelihood	Consequence	Residual Risk
							rehabilitation requirements, to be specified in the Project contract documentation.			
		Loss of aquatic habitat due to dewatering of farm dams within the construction footprint or sections of creek prior to creek diversions.	Habitat for the Mary River turtle, Mary River cod and the white-throated snapping turtle has been assessed as marginal or absent at the creek crossings, and habitat preferences show these species are unlikely to occur upstream of barriers or weirs.	3	3	9	Implementation of a dewatering strategy for any activity involving the taking of water or draining of waterways for the purposes of diversion or decommissioning of dams. DTMR is committed to consulting with specialists including Dr Col Limpus, Chief Scientist of the Threatened Species Unit, Queensland Department of Environment and Heritage Protection to identify suitable control measures required to be included in this strategy.	3	2	6
	Habitat connectivity	Disruption to riparian and aquatic habitat connectivity as a result of the construction works.	All the creek crossing points are on tributaries to the Mary River with marginal habitat located above the potential point of impact, and existing barriers between known Mary River turtle breeding habitat and potential white-throated snapping turtle breeding habitat downstream and the works area.	5	2	10	A temporary diversion will be in place at each of the waterways during the construction of the realignment of the creeks to maintain fish passage throughout the construction of the bridge structures. Any areas of aquatic habitat impacted by the works will be rehabilitated in accordance with the Project contract documentation.	3	1	3
	Physiological condition	Increased sediment loading of the waterways as a result of increased erosion and/or sediment release from the construction site leading to impaired capacity for cloacal respiration by the Mary River turtle and the white-throated snapping turtle.	Distance upstream of works area to known Mary River turtle habitat and potential white-throated snapping turtle breeding habitat, This provides a buffer zone in which naturally occurring sediment can settle before reaching known or potential nesting areas.  Low flow/ velocities of the four main creeks that flow to the Mary River.  The extent of creek diversion works has been minimised as much as possible to maintain existing flood and hydraulic conditions as close as possible to existing conditions.	3	4	12	The ESC measures described in Part B of this report will be implemented onsite. This will include adaptive and corrective measures to identify and rectify any failings in the ESC measures to limit the potential of downstream impacts originating from the works area.  The works area will be stabilised and rehabilitated in accordance with the Project specific rehabilitation management plan which specifies appropriate species for revegetation, weed management protocols and fencing requirements to restrict public access.	2	2	4

Activity	Sensitive Receptor	Potential Impact	Mitigating Factors	Pre-mitigation			Mitigation/Management Measures	Post-mitigation		
				Likelihood	Consequence	Inherent Risk		Likelihood	Consequence	Residual Risk
	Nesting habitat (Mary River turtle, white-throated snapping turtle)	Increased sediment loading of the waterways, and/ or modified flooding regimes causing smothering or washout of downstream sand banks used as nesting sites.	Most known Mary River turtle nesting areas are on the Mary River and not on the tributaries that will be crossed by the Project. Potential white-throated snapping turtle habitat may also occur in the Mary River downstream of the Project area, though surveys have not been undertaken to confirm this. Additionally, the nearest record (1998) of this species in the EHP database is along the Mary River approximately 14km south west of the Project area. The distance from the works area and the confluence with the Mary River provides a buffer zone in which naturally occurring sediment can settle before reaching known or potential nesting areas.  The extent of waterway diversions has been minimised as much as possible to maintain existing flood and hydraulic conditions as close as possible to existing conditions.	3	4	12	The ESC measures described in Part B of this ESCP will be implemented onsite. This will include adaptive and corrective measures to identify and rectify any failings in the ESC measures installed onsite.  Corrective actions will be included in the ESCP to limit the potential for the progression of a sediment slug downstream towards the Mary River.  The works area will be stabilised and rehabilitated in accordance with the Project specific rehabilitation management plan which specifies appropriate species for revegetation, weed management protocols and fencing requirements to restrict public access.	1	4	4
Operation of highway	Riparian vegetation	Loss of riparian vegetation at the point of the creek crossing	The extent of creek diversion works have been minimised as much as possible, reducing the extent of riparian clearing required.	5	2	10	The designated construction footprint will be clearly marked. Clearing will not occur outside of the designated clearing zones. Riparian vegetation will be rehabilitated in accordance with the contract documentation. This includes requirements for weed management. During the Operational phase the maintenance works will be undertaken in accordance with the Road Maintenance Performance Contract.	2	2	4
	Water quality	Contaminants from road enter creek during storm events	Permanent water quality treatment devices are included as part of the Project design.	3	2	6	Permanent water quality treatment devices to be maintained for the life of the infrastructure to ensure full functionality, in accordance with the Road Maintenance Performance Contract.	2	2	4



Activity	Sensitive Receptor	Potential Impact	Mitigating Factors	Pre-mitigation			Mitigation/Management Measures	Post-mitigation		
				Likelihood	Consequence	Inherent Risk		Likelihood	Consequence	Residual Risk
	Aquatic habitat	Permanent modification of aquatic habitat at the point of creek crossing	The length of creek diversions have been minimised as much as possible, reducing the extent of modification of aquatic habitat required.	5	2	10	Removal of vegetation near the waterways will be limited to the construction footprint only. Clearing will not occur outside of the designated clearing zones. Riparian vegetation will be rehabilitated in accordance with the contract documentation.	2	2	4
	Habitat connectivity	Disturbed connectivity of riparian and aquatic habitat at the point of creek crossing	Riparian habitat will be fragmented at the point where the road crosses the creek. Aquatic habitat under the road will remain connected, albeit modified (e.g. shaded by road, fringing riparian removed).	5	2	10	The waterway diversions have been designed to minimise the impact on habitat connectivity and the recreate the waterways to their natural formation (with respect to channel area and gradient) as far as possible. The diversions will be revegetated in accordance with rehabilitation management plans prepared for each site to ensure connectivity is maintained.	1	2	2
	Physiological condition (Mary River turtle and white-throated-snapping turtle)	Increased sediment loading of water as a result of increased erosion from maintenance and access tracks associated with the road at the point where it crosses the creek, leading to impaired capacity for cloacal respiration.	Access track requirements have been minimised at creek crossings.	4	3	12	All maintenance and access tracks at the waterways will be sealed, treated or and/or revegetated to minimise the erosion risk.	1	3	3
	Nesting habitat (Mary River turtle, white-throated snapping turtle)	Increased sediment loading of water, and/or modified flooding regimes causing smothering or washout of downstream sand banks used as nesting sites	Access track requirements have been minimised at creek crossings.  Most known Mary River turtle nesting areas are on the Mary River and not on the tributaries that will be crossed by the highway. There is also a potential for white-throated snapping turtles in the Mary River downstream, however surveys have not been undertaken to confirm this. There is less likelihood that white-throated snapping turtle will be present beyond existing upstream barriers. This distance	3	3	9	All maintenance and access tracks at the waterways will be sealed, treated or and/or revegetated to minimise the erosion risk.	1	3	3

Activity	Sensitive Receptor	Potential Impact	Mitigating Factors	Pre-mitigation			Mitigation/Management Measures	Post-mitigation		
				Likelihood	Consequence	Inherent Risk		Likelihood	Consequence	Residual Risk
			provides a buffer zone in which sediment can settle before reaching known or potential nesting areas.							

## 4.5 Significant Impact Assessment

### 4.5.1 Significant Impact Criteria

Both the Mary River turtle and the Mary River cod are listed as 'endangered' under the EPBC Act. The white-throated snapping turtle is listed as 'critically endangered'. The EPBC Act *Significant Impact Guidelines* (version 1.1) identifies the following criteria which are to be considered in any assessment of significant impact for a critically endangered or endangered species:

*An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:*

- *lead to a long-term decrease in the size of a population*
- *reduce the area of occupancy of the species*
- *fragment an existing population into two or more populations*
- *adversely affect habitat critical to the survival of a species*
- *disrupt the breeding cycle of a population*
- *modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline*
- *result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat*
- *introduce disease that may cause the species to decline, or*
- *interfere with the recovery of the species.*

### 4.5.2 Assessment of Significant Impact

As discussed previously in this Report, the main waterways within the Project area were assessed as having the potential to provide marginal habitat for the Mary River cod and the Mary River turtle. A review of the habitat preferences of the white-throated snapping turtle has indicated this species has similar habitat preferences and characteristics as the Mary River turtle. There are significant barriers to movement for these species between the Project area and downstream habitat areas. These species are exposed to a number of other impacting processes, including agricultural land uses (runoff and trampling of turtle nests by cattle) and water impoundments, which are impacts that cannot be attributed to the Project. Water quality, riparian vegetation loss and sedimentation have been identified as potential impacts attributable to the Project, however these will be appropriately mitigated through the implementation of strict ESC measures during construction, and the design and construction of creek diversion works that replicate existing creek morphology and habitats.

The Conservation Advice (TSSC, 2014) for the white-throated snapping turtle identifies all populations within the Mary, Burnett and Fitzroy catchments as "important populations" for the purpose of significant impact assessments. Furthermore, important habitat for the survival of the species is described as all in-stream and adjacent banks within approximately 50m, in areas identified as suitable habitat.

The impacts assessed in Section 4.4 and Table 9 have been considered against the significant impact guidelines, to determine if significant impacts to a matter of national environmental significance are likely to occur as a direct or indirect result of the Project (refer to Table 11 and Table 12).

These tables demonstrate that with the implementation of erosion and sediment controls outlined in Part B of this Report, no significant impacts are expected as a result of the construction or operation of the Project.

Furthermore it is demonstrated that all risks identified can be reduced to low or moderate threat levels with the implementation of the mitigation and management measures outlined in Table 10. Therefore residual impacts to the Mary River turtle, the Mary River cod, and the white-throated snapping turtle are not anticipated to occur and therefore offsets under item (c) in the RFI from DoE are not proposed.

**Table 11: Assessment against the significant impact criteria, Mary River turtle and Mary River cod**

Significant Impact Guidelines	Mary River cod and Mary River turtle
<ul style="list-style-type: none"> <li><i>lead to a long-term decrease in the size of a population</i></li> </ul>	<p>Direct or indirect potential impacts of the Project are not anticipated to lead to a long term decrease in the size of the population. Habitat within the Project area has been assessed as marginal or absent, with significant instream barriers between the Project area and areas of downstream habitat on Traveston Creek and to a lesser extent on Kybong Creek, Cobbs Gully, and Jackass Creek. ESC measures will address the potential for downstream effects, including sedimentation of known Mary River turtle breeding areas at the confluence of Traveston Creek and the Mary River and water quality (influencing breathing and feeding ability of the turtle).</p> <p>Therefore the Project is not expected to directly or indirectly lead to a long-term decrease in the size of a population, with the proposed management measures described in Part B of this Report.</p>
<ul style="list-style-type: none"> <li><i>reduce the area of occupancy of the species</i></li> </ul>	<p>Habitat within the Project area was assessed as marginal or absent, and disconnected from downstream habitats due to existing instream barriers. ESC measures described in Part B will address the potential for downstream effects such as water quality and sedimentation that could potentially limit the area of occupancy further.</p> <p>Therefore the Project is not expected to result in the reduction of the area of occupancy of the Mary River turtle or the Mary River cod.</p>
<ul style="list-style-type: none"> <li><i>fragment an existing population into two or more populations</i></li> </ul>	<p>There is no existing population of either species within the Project area. Existing downstream barriers limit opportunities for populations to enter the Project area and upstream. Furthermore the design of the bridges and creek diversions were developed so as to maintain fish passage, and limit impacts to local stream morphology as much as possible.</p> <p>Therefore the Project is not expected to fragment an existing population into two or more populations.</p>
<ul style="list-style-type: none"> <li><i>adversely affect habitat critical to the survival of a species</i></li> </ul>	<p>Habitat within the Project area has been assessed as marginal, and potential downstream impacts will be mitigated through the implementation of the erosion and sediment control measures described in Part B during construction. The waterway diversion works have been designed to limit the impacts to riparian habitat.</p> <p>Therefore the Project is not expected to adversely affect habitat critical to the survival of the Mary River turtle or the Mary River cod.</p>

Significant Impact Guidelines	Mary River cod and Mary River turtle
<ul style="list-style-type: none"> <li><i>disrupt the breeding cycle of a population</i></li> </ul>	<p>Potential downstream impacts including sedimentation and siltation of deep hollows (breeding habitat for the Mary River cod) or sand banks (breeding habitat for the Mary River turtle) will be mitigated through the implementation of the ESC measures described in Part B during construction.</p> <p>Therefore the Project is not expected to disrupt the breeding cycle of the Mary River turtle or the Mary River cod.</p>
<ul style="list-style-type: none"> <li><i>modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i></li> </ul>	<p>The Project will not result in the loss of habitat or reduction of habitat quality to the extent that the species is likely to decline; the habitat within the Project area is assessed as marginal or absent, and ESC measures described in Part B will address the potential for downstream effects.</p> <p>Therefore the Project is not expected to result in habitat loss or quality reduction to the extent that it contributes to a decline of the Mary River turtle or the Mary River cod.</p>
<ul style="list-style-type: none"> <li><i>result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</i></li> </ul>	<p>Creek diversions are to be undertaken for the Project, however rehabilitation of these areas will be carried out in accordance with the Project specific rehabilitation management plan which specifies appropriate species for revegetation, weed management protocols and fencing requirements to restrict public access. Suitable rehabilitation and revegetation works will be implemented to minimise the risk of the Project introducing invasive aquatic or terrestrial species.</p>
<ul style="list-style-type: none"> <li><i>introduce disease that may cause the species to decline, or</i></li> </ul>	<p>The Project is not expected to introduce disease or stresses that influence disease, the ESC measures described in Part B will address potential impacts to downstream water quality and habitat factors.</p>
<ul style="list-style-type: none"> <li><i>interfere with the recovery of the species.</i></li> </ul>	<p>A review of the Mary River cod Research and Recovery Plan (Simpson &amp; Jackson, 2000) and the recovery actions for the Mary River turtle (DEHP, 2011) indicate that the Project is not likely to interfere with the recovery of the species, or any of the nominated recovery actions under state or federally funded recovery plans.</p>



**Table 12: Assessment against the significant impact criteria, white-throated snapping turtle**

Significant Impact Criteria	Response for White-throated Snapping Turtle
<ul style="list-style-type: none"> <li>• <i>Lead to a long-term decrease in the size of a population</i></li> </ul>	<p>The proposed works are not expected to result in a direct or indirect impact to the size of the white-throated snapping turtle population. The Construction phase of the Project is to be undertaken in a manner that avoids significant disturbance, injury or fatality to the species.</p> <p>Habitat assessments conducted for the Mary River turtle, a species which occupies a similar habitat and range, have been reviewed to determine the potential for the white-throated snapping turtle to occur. Habitat is considered to be minimal or absent across the Project area, with instream barriers in the major waterways preventing movement further downstream. ESC measures specified for the Mary River turtle will address the potential for downstream effects.</p> <p>Therefore with the implementation of suitable mitigation measures, the Project is not expected to directly or indirectly lead to a long-term decrease in the size of a population.</p>
<ul style="list-style-type: none"> <li>• <i>Reduce the area of occupancy of the species</i></li> </ul>	<p>As identified for the Mary River turtle, habitat within the Project area was determined to be marginal or absent due to instream barriers. ESC measures discussed in Part B of this document are intended to mitigate impacts associated with water quality and prevent any further reduction of the area of occupancy of the species.</p>
<ul style="list-style-type: none"> <li>• <i>Fragment an existing population into two or more populations</i></li> </ul>	<p>A population of white-throated snapping turtle has not been identified within the Project area. Downstream barriers observed within the Project area currently limit movement opportunities between populations. Additionally, the project design has been tailored to ensure fish passage is maintained to minimise impacts on the stream morphology.</p> <p>As such, the Project is not expected to fragment an existing population into two or more populations.</p>
<ul style="list-style-type: none"> <li>• <i>Adversely affect habitat critical to the survival of a species</i></li> </ul>	<p>Suitable habitat in the Project area for the white-throated snapping turtle has been assessed as marginal or absent. The streams are ephemeral and largely shallow. The implementation of ESC measures will mitigate potential impacts to the species habitat and design will be limited to the greatest extent possible to minimise riparian vegetation clearing.</p> <p>The Project is therefore not expected to adversely affect habitat critical to the survival of the white-throated snapping turtle.</p>
<ul style="list-style-type: none"> <li>• <i>Disrupt the breeding cycle of a population</i></li> </ul>	<p>Water quality impacts that may occur as a result of the Project are to be mitigated through the implementation of ESC measures. These will be targeted towards ensuring downstream banks (nesting habitat) are not eroded and the substrate is not altered as a result of the Project or related</p>

Significant Impact Criteria	Response for White-throated Snapping Turtle
	<p>project activities. ESC measures for the Project are described in Part B.</p> <p>The Project is therefore not anticipated to disrupt the breeding cycle of a population of white-throated snapping turtle.</p>
<ul style="list-style-type: none"> <li><i>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i></li> </ul>	<p>The white-throated snapping turtle relies on flowing and well-oxygenated waters that are either marginal or absent within the Project area. Waterways will not be permanently isolated as a result of the Project. ESC measures, as described in Part B, will be implemented to address potential downstream effects.</p> <p>The Project is not expected to result in the loss of habitat or reduction of habitat quality to the extent that the species is likely to decline.</p>
<ul style="list-style-type: none"> <li><i>Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat</i></li> </ul>	<p>Pest species, both flora and fauna, are a known threat to the white-throated snapping turtle that require management. Creek diversions are to be undertaken for the Project, however rehabilitation of these areas will be carried out in accordance with the Project specific rehabilitation management plan which specifies appropriate species for revegetation, weed management protocols and fencing requirements to restrict public access. Suitable rehabilitation and revegetation works will be implemented to minimise the risk of the Project introducing invasive aquatic or terrestrial species.</p>
<ul style="list-style-type: none"> <li><i>Introduce disease that may cause the species to decline</i></li> </ul>	<p>The Project is not expected to introduce diseases or stresses that influence disease in the species. Implementation of ESC measures described in Part B will address the potential for impacts to downstream water quality and habitat.</p>
<ul style="list-style-type: none"> <li><i>Interfere with the recovery of the species</i></li> </ul>	<p>A review of the recovery actions (EHP, 2011) and management actions (TSSC, 2014) indicate that the Project is not considered likely to interfere with the recovery of the white-throated snapping turtle.</p>

# Part B: Erosion and Sediment Control

## 5. Erosion and Sediment Control

### 5.1 Contractual Implications

As outlined in Section 1, Part B of the ESCP has been prepared in accordance with the DoE *Environmental Management Plan Guidelines* as required by item (b) of the RFI. Furthermore, the ESC measures proposed in this document reference the International Erosion Control Association (IECA) Best Practice Sediment and Erosion Manual (IECA Manual) as required by Clause 10.1 of TMR's Technical Specification MRTS52 Erosion and Sediment Control (MRTS52 – Erosion and Sediment Control) (refer to Appendix C for a copy of MRTS52 – Erosion and Sediment Control). Additional environmental requirements are provided in the TMR's Technical Specification MRTS51 Environmental Management (refer to Appendix B). The purpose of Part B of the ESCP is to provide a conceptual set of overarching ESC principles to be used by the Construction Contractor (the Contractor) to guide the development of the Contractor's Progressive ESC Plans (PESCPs). The conceptual ESC measures in this ESCP will assist the Contractor in meeting onsite and discharge water quality performance criteria to minimise impacts to the surrounding environment and habitat for the Mary River turtle, Mary River cod and white-throated snapping turtle. The control principles and management techniques outlined in this document are to be adopted by the Contractor when developing their PESCPs to minimise/eliminate potential for sediment laden runoff to be discharged into the receiving environment.

Whilst this ESCP does not prescribe or locate permanent or temporary sediment and erosion control measures in detail, it provides overarching principles for ESC devices. Therefore and notwithstanding Clause 6 of TMR's specification MRTS52 – Erosion and Sediment Control, the Contractor is required to prepare and submit PESCPs to TMR for approval prior to any construction work commencing.

The PESCPs will be developed by the Contractor prior to and progressively during construction, taking into consideration site knowledge and the current stage of the works. These PESCPs will be submitted to cover each stage of construction, including clearing and grubbing, drainage, earthworks and construction of structures. The PESCPs will be developed in accordance with the ESC principles outlined in this document, Clause 1.4 and Clause 6.2 of MRTS52 – Erosion and Sediment Control including those requirements relating to high-risk projects.

As outlined in Clause 6 of MRTS52 – Erosion and Sediment Control, no works including natural surface disruption, vegetation clearing or ESCs including the storage of stockpiles shall commence until the relevant PESCP has been approved by TMR.

Ongoing monitoring and maintenance of permanent water quality devices will be undertaken under the TMR Road Maintenance Performance Contract or other arrangement as managed by TMR.

## 6. Environmental Outcomes and Performance Indicators

### 6.1 General

All works undertaken onsite will be required to occur in such a way that environmental nuisance or harm of waterways within, adjacent to or immediately downstream of the construction area or permanent water bodies within the construction area are avoided. In accordance with MRTS52 – Erosion and Sediment Control there should also be no erosion resulting from construction practises unless there are provisions within the worksite to manage resultant sediment. Avoiding impacts to waterways within, adjacent to or downstream of the construction site will assist in minimising impacts to the Mary River turtle, and Mary River cod and white-throated snapping turtle. There are a number of threats to these species which are beyond the scope or influence of this Project; consequently the ESC measures outlined in this document are specific to Project risks and activities.

The following environmental outcomes and performance indicators will be used to measure the efficiency of the management measures proposed within this ESCP in protecting water quality and therefore downstream impacts to the Mary River turtle, Mary River cod and white-throated snapping turtle.

### 6.2 Receiving Waters

The following receiving water quality performance indicators are in accordance with Clause 8.1.3 of MRTS52 – Erosion and Sediment Control. The water quality criteria included in Clause 8.1.3 have been replicated below in Table 13. Water quality performance indicators are either a specific level (column 1) or a percentage or value change from upstream compared to downstream (column 2).

A pre-construction water quality monitoring program is currently being undertaken at sites upstream and downstream of the alignment on Kybong Creek, Traveston Creek, Jackass Creek and Cobbs Gully.

**Table 13: Water quality criteria (Clause 8.1.3 MRTS52 – Erosion and Sediment Control)**

Parameter	Investigation Criteria	
	Level	Change (Upstream – Downstream)
Dissolved oxygen (mg/L or % saturation)	85% saturation for flowing waters >5 mg/L	10% decrease
pH	General: 6.5 - 8.5 Wallum/acidic ecosystems: 5.0 – 7.0	1.0 pH unit change
Total suspended solids (mg/L) or turbidity (NTU)		10% increase
Electrical conductivity		20% change
Hydrocarbons	No visible trace	
Waste	No waste or litter	



## 6.3 Discharge Waters

Water captured in ESCs that is unable to be used on site for construction purposes such as dust suppression, will be required to be discharged off-site to maintain the functionality and retention of the controls for future rain events.

Controlled discharges of water from the site will be required to comply with the specific performance outcomes specified in Clause 8.1.2 of MRTS52 – Erosion and Sediment Control including the discharge criteria for high risk projects, replicated below in Table 14.

**Table 14. Discharge criteria (Clause 8.1.2 - MRTS52 – Erosion and Sediment Control)**

Parameter	Discharge criteria
pH	General: 6.5 - 8.5
Total suspended solids (mg/L)	Not to exceed 50 mg/L for rainfall events up to and including the 85 <sup>th</sup> percentile 5-day rainfall event
Turbidity (NTU)	The turbidity limit shall be determined by the Contractor by correlating turbidity with total suspended solids limits
Hydrocarbons	No visible trace
Waste	No waste or litter

## 7. Environmental Management Roles and Responsibilities

### 7.1 Roles and Responsibilities

The Contractor is required to comply with the *Environmental Protection Act 1994* and subordinate legislation which relates to the protection of water quality and also sets out the general environmental duty. The general environmental duty states that a person must not carry out an activity that may cause or is likely to cause environmental harm unless all reasonable and practicable measures to prevent or minimise harm are undertaken. Table 15 sets out the environmental management roles and responsibilities of parties involved in the implementation of this ESCP.

**Table 15: Environmental management roles and responsibilities**

Role	Responsibility
TMR	<ul style="list-style-type: none"> <li>Gain approval on EPBC Act conditions.</li> <li>Include approved documents in contractual documents for the Project.</li> <li>Ensure implementation of conditions of approvals.</li> <li>Review and approve Contractor's Environmental Management Plan (Construction) (EMP(C)) and other environmental management related documents.</li> <li>Regular inspections and audits of the site to ensure compliance with the contract, approvals, relevant legislation and the Contractor's EMP(C).</li> <li>Management of non-conformances.</li> <li>Submission of documentation in the form of records and reports to regulatory authorities as required as a condition of the approvals.</li> <li>Stop works if compliance with the contract approvals, relevant legislation and the Contractor's EMP(C) is not being met.</li> </ul>
Contractor	<ul style="list-style-type: none"> <li>Comply with all legal requirements including Commonwealth and State approval conditions</li> <li>Prepare and implement an EMP(C) that includes all relevant conditions of the EPBC Act approval including this ESCP.</li> <li>Inform all staff and sub-contractors of their environmental obligations outlined in the EMP(C)</li> <li>Obtain all additional licences and approvals prior to the commencement of any work for which a licence or approval is required</li> <li>Undertake environmental monitoring as detailed in Section 10</li> <li>Report environmental incidents and non-conformances to TMR, Department of Environment and Heritage Protection (EHP) and DoE where necessary</li> <li>Report and monitor any non-compliance, manage remediation action to correct incidents of environmental non-conformance and review management procedures where necessary</li> <li>Undertake onsite audits and site inspections of ESC measures</li> <li>Maintenance of environment controls</li> </ul>

Role	Responsibility
Project staff (contractors and TMR employees)	<ul style="list-style-type: none"> <li>• All personnel involved in vegetation clearing, bulk earthworks and drainage activities are to attend an environmental site induction which will cover what is permissible under law and animal welfare implications as well as emergency procedures and reporting of environmental incidents in relation to water quality</li> <li>• Comply with the general environmental duty under the <i>Environmental Protection Act 1994</i></li> <li>• Compliance with the Contractor's EMP(C).</li> </ul>

## 8. Mitigation Measures

### 8.1 General

The mitigation strategies described in this section outline specific management actions to be undertaken during the Construction phase of the Project to assist in minimising the risk of potential impacts (i.e. sedimentation, run-off and water quality changes) to potential habitat for the Mary River turtle, Mary River cod and the white-throated snapping turtle downstream of the Project area as described in Sections 2, 3 and 4. Monitoring of these potential impacts is necessary during construction to minimise future impacts via management actions within the Project footprint.

### 8.2 Construction Mitigation Measures

#### 8.2.1 Environmental Training and Induction

An environmental site induction must be undertaken by all site personnel, contractors and sub-contractors. This induction will include introducing all staff to the potential presence of Mary River turtle, Mary River cod and the white-throated snapping turtle within the work area and downstream. This induction is required to include all items within this ESCP and those listed in Section 9.4 of the MRTS51 – Environmental Management which relate to the implementation of exclusion zones and ESC measures. Section 6.19 of the IECA Manual also outlines items to be included in an environmental induction for a large construction site, including the following:

- *Objectives of the Environmental Management Plan (Construction) and/or Erosion and Sediment Control Plan as appropriate for the site*
- *Statement of duty of care*
- *Identification of site specific environmental values*
- *Specific conditions of any environmental licences, permits and approvals*
- *Use of the EMP (C)*
- *Incident reporting procedures*
- *Specific equipment operational and maintenance procedures*

The Contractor is required to keep a record of all site personnel who have undertaken the environmental training and induction. Records are required to include, the person who undertook the training, the date training was undertaken, name of the person conducting the training and a summary of the training given.

#### 8.2.2 Fauna Spotter Catchers

A licensed fauna spotter catcher is to be engaged to manage and supervise all aquatic fauna tasks. The fauna spotter catcher shall be approved by DEHP for the handling, capture and release of native fauna.

A dewatering strategy is to be prepared, and the fauna spotter catcher is required to undertake a pre-clearance survey for any dewatering activities required on site including dams, waterway diversions etc. to remove and relocate aquatic fauna species encountered. TMR is committed to consulting with specialists including Dr Col Limpus, Chief Scientist of the Threatened Species Unit, Queensland Department of Environment and Heritage Protection, to inform the dewatering strategy and provide advice to TMR as required during dewatering activities.



Any instream works within the four main waterways (Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek) are to be undertaken in consideration of the combined breeding period of the Mary River turtle, Mary River cod and the white-throated snapping turtle as noted in Section 8.2.4.

Any individuals encountered during these works are to be inspected for signs of injury. Where possible, uninjured aquatic fauna are to be relocated to suitable habitat within the vicinity of the same waterway and away from areas potentially impacted by construction works.

The fauna spotter catcher will be required to prepare a report following the pre-clearance surveys and dewatering activities. These reports will be required to be provided to the Contractor and TMR within 14 days of the completion of the works.

### 8.2.3 Construction Staging

Staging of works can be the most effective tool to minimise erosion risk due to the reduction in the duration of soil disturbance. Specific staging of works will be required during the waterway diversion works associated with each of the four main waterways (Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek) to minimise disturbance of these systems. Construction works at creek crossings is proposed to occur in three stages. Stage one involves enabling works including implementing environmental controls (including ESCs), establishing site access roads to the diversion works area and site clearing. Stage two comprises construction of a temporary diversion and installation of a culvert crossing to facilitate construction of the bridge by allowing north-south construction traffic movements and creating a dry work area through the middle of the site to install piles and bridge piers. Stage three includes construction of the permanent diversion, rehabilitation works, the removal of the temporary diversion and on-going monitoring and maintenance.

Ultimately the Construction Contractor will be responsible for determining appropriate construction staging in accordance with any conditions of State Government approval, however, Table 4.4.7 of the IECA Manual provides best practice requirements for land clearing and rehabilitation requirements for construction projects based on erosion risk.

### 8.2.4 Construction Timing

The Contractor's daily works schedule shall take into consideration the expected and predicted rainfall forecast for the region. Rainfall is required to be monitored in accordance with Clause 8.2.1 of MRTS52 – Erosion and Sediment Control. Any instream works within the four main waterways (Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek) are to be undertaken in consideration of the combined breeding period for:

- The Mary River cod (*Maccullochella mariensis*) spawning season occurring from August to December (DoE, 2015) and
- The Mary River turtle (*Elusor macrurus*) nesting season in spring and early summer (October to December) with hatching occurring from late November through to early January (Limpus, 2008).
- The white-throated snapping turtle (*Elseya albagula*) nesting season in May to July (Limpus 2008) with hatching December to January (Thompson et al 2006).

A review of rainfall statistics from Bureau of Meteorology monitoring stations surrounding the Project area (Gympie, Traveston and Cooroy Composite) indicates a general trend of a dry winter period extending into early spring, and higher rainfall recorded from late spring, through summer and into autumn, which is consistent with seasonal conditions across south-east Queensland.

Waterway diversions and associated rehabilitation works at Traveston Creek and Kybong Creek will subsequently be required to be completed prior to December 2016 to avoid the typical wet season of the region.

# 9. Erosion and Sediment Control Management Measures

## 9.1 General

The following sections outline the overarching principles of drainage, ESC to be applied for the Project in accordance with the general principles provided in the IECA Manual. An integration of all three principles is required to be applied to the construction site to reduce the likelihood of environmental harm occurring. The Contractor is responsible for implementing all ESC measures in accordance with MRTS52 – Erosion and Sediment Control and Annexure MRTS52.1.

## 9.2 Drainage Controls

### 9.2.1 General

Appropriate drainage control measures shall be installed in accordance with Section 4.3 of the IECA Manual and shall be documented in the Contractor's PESCPs. Controls shall include the following:

- *Temporary drainage works*
- *Flow diversion around soil disturbances and stockpiles*
- *Lateral drain spacing on long continuous slopes*
- *Low gradient drainage*
- *Drainage down slopes*
- *Outlet structures for temporary drainage systems*
- *Velocity control structures*
- *Channel and chute linings*
- *Drainage controls on unsealed roads*
- *Temporary watercourse crossings and encroachments (e.g. temporary waterway barrier works required at each of the four major waterways)*

As the predicted life of the construction is expected to exceed 24 months, all temporary drainage controls must be designed to withstand a 1 in 10 year ARI storm event, as required by Section 4.3.1 of the IECA Manual.

### 9.2.2 Drainage Diversion Works

Drainage diversion works shall be constructed to direct 'clean' water from external catchments away from or through the construction site and 'dirty' water to appropriate ESC devices for treatment prior to discharge into the receiving environment. Drainage diversion drains are to be constructed as parabolic or trapezoidal channels and appropriately treated to minimise the risk of scour occurring. Velocity controls shall be installed as required to mitigate high flow volumes increasing the risk of scour and erosion. Drains shall be sized appropriately to accommodate a 1 in 10 year ARI storm event with consideration of the nominated velocity controls in place.

## 9.3 Erosion Controls

### 9.3.1 General

Erosion is dependent on the likelihood and intensity of predicted and/or expected rainfall. Where construction activities are scheduled during the dry season when rainfall is unlikely or limited, the required erosion protection measures may be significantly less than if construction was to occur during the wet season (IECA, 2008). As noted in section 8.2.4, the Project area is subject to dry winters and experiences higher rainfall during summer months.

Erosion control measures shall be designed and installed to limit the amount of erosion from any exposed areas and to protect the water quality of the downstream environment. ESC measures are to be progressively implemented throughout the life of the Project. In accordance with Clause 6 of MRTS52 – Erosion and Sediment Control the Contractor is required to prepare and submit a PESCP for each stage of works. Each PESCP is required to be submitted to TMR for approval and works within that section must not commence until the PESCP has been approved by TMR.

The following ESC principles are an excerpt from Section 2.1 of the IECA Manual and are required to be given consideration during the preparation and implementation of the Contractor's PESCPs in addition to those items detailed in Clause 6.2 of MRTS52 – Erosion and Sediment Control:

- *Construction schedules should aim to minimise the extent to which and duration that any and all areas of soil are exposed to the erosive effects of wind, rain and flowing water*
- *Wherever reasonable and practicable, land clearing and site rehabilitation must be appropriately staged to minimise the duration of soil exposure and the area of exposure at any given instant*
- *As long as the risks of rainfall or strong winds exist on a site, land disturbances should be restricted to those areas required for the current stage of works*
- *Wherever reasonable and practicable, major land disturbances should be scheduled for the least erosive periods of the year*
- *Disturbances to high and extreme erosion risk areas should be minimised, if not totally avoided, especially during the most erosive part of the year*
- *Wherever reasonable and practicable, the disturbance of dispersive soils should be minimised, if not totally avoided*
- *Disturbances to the existing ground cover should be delayed as long as possible*
- *Construction procedures should aim to minimise the extent of unnecessary soil disturbance, including any soil disturbances outside the designated work area*

### 9.3.2 Minimise Construction Area

Although the Project footprint has been pre-defined, the overall area of disturbance shall be minimised by the Contractor through the utilisation of existing cleared or modified areas where possible. Specifically, the construction zone shall minimise encroachment on sensitive areas such as riparian vegetation, Traveston State Forest and any mapped regulated vegetation through the use of no-go zones. Exclusion zones are to be clearly set out and marked prior to construction activities commencing.

### 9.3.3 Stabilised Site Access

Stabilised all-weather entry and exit points shall be established to minimise the risk of construction and site personnel vehicles transporting sediment onto public access roads. Stormwater runoff from access roads and stabilised entry/exit points must drain to an appropriate sediment control device. The site entry/exit points shall be constructed in accordance with Section 4.5.10 of the IECA Manual.

In the event that sediment is transported onto a public road adjoining the Project, supplementary street sweeping may be required and will remain the responsibility of the Construction Contractor.

### 9.3.4 Works within a Watercourse

Construction works at Traveston Creek, Kybong Creek, Cobbs Gully and Jackass Creek and several minor waterways will require development approval under the Queensland *Fisheries Act 1994* for permanent waterway barrier works (operational works). A development approval is required for these works due to either the placing of a permanent waterway barrier (i.e. waterway diversion) or for the placing of a temporary waterway barrier for a duration longer than the maximum allowable for the specific waterway. The Contractor shall be required to comply with the conditions of each approval. Any temporary waterway barriers required during construction, which do not have an approval in place, shall be constructed in accordance with the Department of Agriculture and Fisheries (DAF) most current *Code for self-assessable development Temporary waterway barrier works WWBW02*.

Furthermore, a water licence to interfere with the course of flow of Traveston Creek and Kybong Creek is required under Section 206 (4) of the Queensland *Water Act 2000*. The water licence is required due to the permanent realignment of these two waterways as a result of the construction works.

The following performance criteria have been defined for the construction and rehabilitation of creek diversion works at Traveston and Kybong Creeks, as part of the water licence application:

- Maintain flow of creeks during construction of waterway crossings.
- In accordance with the relevant approval for operational work that is the constructing or raising of a waterway barrier, ensure fish passage is provided during construction and operation of the creek diversion.
- Maintain discharge and receiving water quality as per Clause 8 of MRTS52.
- No clearing of vegetation outside the defined works limit
- No injury or death to aquatic fauna.

The following ESC principles developed from Section 6.9 of the IECA Manual shall be implemented in and around waterways:

- *Minimise disturbance to the riparian zone*
- *Conduct construction activities within watercourses as fast and efficiently as possible*
- *Where possible and practicable, reduce the number of temporary crossings over watercourses*
- *Install diversion drains around all internal access tracks leading to each watercourse. This will assist in diverting dirty water away from the sensitive area and toward a sediment basin for treatment and release*
- *Construction activities within the bed and banks of the watercourses shall occur during dry periods. No construction activities shall occur within the bed and banks of a watercourse during periods of significant rainfall or when there is significant flow*
- *Take all reasonable and practicable measures to minimise the extent of soil disturbance within the watercourse prior to forecast rainfall and/or elevated flow*
- *Fuel and chemical storage to be situated at least 50m away from drainage lines and watercourses*
- *Develop a site based Spill Clean-up Procedure that outlines the methodologies for confining contaminated water, fuel or oils and preventing them from entering waterways and appropriate off-site disposal*
- *Machinery used within and around each watercourse shall be stored, refuelled and maintained outside the high banks of the watercourse or drainage line*

- *Where practicable, sediment generated by construction activities immediately adjacent to standing water must be retained by sediment traps such as floating silt curtains*
- *Where outlet structures are designed to enter a waterway, the structure shall not protrude beyond the stream bank and shall align evenly with the bank.*

### 9.3.5 Retain Vegetation

A pre-clearing vegetation assessment is to be undertaken to identify any areas of vegetation to be retained. These areas are required to be clearly marked using no-go zones to mitigate the risk of accidental vegetation clearing occurring. Where vegetation clearing is necessary, any cleared native vegetation shall be mulched and/or retained for uses onsite such as to provide a temporary blanket as erosion control on cleared areas. Vegetation clearing around each of the four main waterways shall be minimised where possible and delayed until absolutely necessary. Progressive stabilisation and, where appropriate, revegetation of disturbed areas shall occur as reasonably practicable.

If vegetation clearing is required to be carried out well in advance of earthworks, the Contractor shall aim to remove only woody vegetation leaving the understory growth. Grubbing and removal of ground cover and understorey is to be delayed until immediately prior to earthworks occurring within that particular stage of works.

### 9.3.6 Stockpile Management

Stockpiles will be required to be constructed in accordance with the requirements of Section 8.4.4 of MRTS 04 – General Earthworks and the following management constraints specified in Section 5.8 of the IECA Manual:

- *Constructed on the contour at least 2m (preferably 5 m) from hazardous areas, particularly likely areas of concentrated water flows (e.g. waterways, roads, slopes steeper than 10%). Where rainfall events within the catchment are likely to cause the adjacent waterways to spill over this distance may need to increase*
- *Stockpile sites shall be appropriately protected from wind, rain, concentrated surface flow and excessive up-slope stormwater surface flows*
- *Protected from run-on water by installing water diversion structures upslope*
- *Sediment filters/fences to be placed immediately downslope of the stockpile to protect adjacent lands and waterways from potential runoff*
- *Located up-slope of an appropriate sediment control system*
- *Provided with an appropriate protective cover (synthetic, mulch or vegetative) if the materials are likely to be stockpiled for more than 28 days*
- *Provided with an appropriate protective cover (synthetic, mulch or vegetative) if the materials are likely to be stockpiled for more than 10 days during those months that have a high erosion risk*
- *Provided with an appropriate protective cover (synthetic, mulch or vegetative) if the materials are likely to be stockpiled for more than 5 days during those months that have an extreme erosion risk*

Stockpile areas and treatments will be identified in the Contractor's PESCPs. This will also include appropriate procedures for management of weeds at stockpile locations and any other areas of disturbance within the defined works area.

### 9.3.7 Cut and Fill Areas

The Project will have a number of cut and fill areas. These areas when exposed can be highly erosive and ESC measures are required to be in place prior to the works commencing. All external catchment drainage lines shall be diverted around these areas via cross drains and drainage channels. Catch banks should be



constructed at the base of the cut and fill areas to drain dirty water to a sediment basin or other appropriate sediment control. In areas where the cut and fill will be associated with moderate slopes, the control measures identified below in Section 9.3.8 shall also be incorporated.

### **9.3.8 Slopes**

The topography of the alignment is hilly and undulating with a natural surface level which varies between 55m - 110m above AHD and slope gradients between 0 – 17.6 % (Jacobs SKM, 2014). The median slope gradient of the natural surface levels is 4.6 % (gently inclined), while the maximum slope gradient is 17.6 % (moderately inclined). No steep slopes (>25%) are present across the alignment. Table 4.4.13 of the IECA Manual provides a variety of ESC measures which can be applied to slopes (mild – steep) when rainfall is expected.

### **9.3.9 Revegetation**

Revegetation and ground coverage of low-growing ground cover vegetation can be one of the most effective forms of long-term erosion controls (IECA, 2008). Vegetation and groundcover increases the surface roughness, slowing stormwater runoff, protects the soil against raindrop impact and reduces the evaporation losses from the underlying soil. Permanent revegetation onsite shall occur as soon as practicable once earthworks are complete in accordance with MRTS16 – General Requirements Landscape and Revegetation Works and relevant sub specifications. ESC measures are required to stay in place until 70% cover is achieved.

Table 4.4.7 of the IECA Manual also outlines the best practise measures for site rehabilitation which is presented dependant on the erosion risk based on monthly erosivity (i.e. between very low – extreme).

Revegetation and rehabilitation actions within creek diversion areas will restore the diversion channel and batter slopes, and surrounding works areas to as close to their pre-disturbance condition as possible. Key aspects of the creek revegetation actions will include stabilisation, replanting, weed control, and restriction of public access and grazing. Revegetation works in these areas will also aim to re-establish riparian vegetation and habitat for aquatic and terrestrial species.

## **9.4 Sediment Control**

### **9.4.1 General**

Sediment control techniques shall be applied across the construction zone to limit and settle the mobilisation of soil particles across the site. Sediment control techniques slow the movement of water and allow the influence of gravity to settle out particles.

### **9.4.2 Dust Suppression**

To minimise wind erosion, water tankers shall be employed to suppress dust onsite during construction periods and other times as necessary. Stabilisation of slopes and exposed channel surfaces must be rehabilitated as soon as possible to minimise the potential environmental risk. Revegetation within riparian zones must be conducted in accordance with the relevant landscaping plans.

### **9.4.3 Sediment Barrier Fencing**

Sediment fences are to be installed where appropriate to trap coarse sediment. Sediment fences are not to be installed across concentrated flow paths. Sediment fences shall be installed in accordance with Standard Drawing SF-01 – SF-02 Sediment Fences (IECA Manual, 2008).

## 9.4.4 Sediment Basins

The Construction Contractor shall determine predicted soil loss from the Construction phase in order to calculate sediment basin requirements which will be incorporated into the PESCPs. The selection, location and design of sediment basins shall be in accordance with Section 3.8 of the *Erosion and Sediment Control Design Criteria Report* (SMEC, 2015), Appendix B, Book 2 and the design fact sheets in Book 4 of the IECA Manual. Type D sediment basins are required when more than 10% of soil is considered dispersive, or when adopted water quality objectives specify strict controls on turbidity levels and/or suspended solids concentrations for discharged waters (IECA, 2008). Type D sediment basins are likely to be required at numerous locations across the length of the alignment. Sediment basins shall be designed, constructed, installed and managed by the Contractor in accordance with Standard Drawing SB-0106 of the IECA Manual and MRTS52 – Erosion and Sediment Control.

Access points to sediment basins are typically anticipated to be in areas where batter slopes transition from cut to fill. The Contractor is responsible for identifying safe, stable, all weather access points to each sediment basin for the purposes of construction and maintenance of the sediment basins.

### 9.4.4.1 Flocculation of Sediment Basins

Sediment basins will be constructed on site at a location to collect sediment-laden runoff from the construction zone for treatment prior to discharge into the receiving environment. Sediment basins will require water quality monitoring prior to the release of water into receiving environments to ensure any water discharged satisfies the discharge water quality criteria outlined in Table 14.

Once in contact with water, dispersive soils can stay suspended for long periods of time due to the electrical charges within the soil properties. Therefore dispersive soils usually require the addition of gypsum or similar to improve settlement properties. Type D sediment basins will be installed across the length of the alignment and flocculants used to treat captured water prior to discharge. The IECA Manual suggests gypsum should be applied at a rate of 32kg/100m<sup>3</sup> of stored water (refer to Table B17 of the IECA Manual for additional information on flocculating agents). The flocculating agent and volumes of treatment agent will be approved by TMR.

As the alignment intersects a number of sensitive environments consideration shall be given to the chemical agent and dosing rate used for flocculation. Some chemical agents contain aluminium which can harm or alter receiving environments when applied incorrectly. Following treatment, the sediment basin shall be pumped out to maintain capacity.

### 9.4.4.2 Maintenance and Management of Sediment Basins

The IECA Manual directs attention to sediment basin maintenance which is based around ensuring the inlet erosion protection within the basin is operating, monitoring the amount of sediment accumulation within the basin and ensuring the outlet is not blocked. The following sediment basin maintenance and inspection principles have been taken from Appendix B.17 of the IECA Manual:

- *Inspect the sediment basins during the following periods:*
  - *During construction to determine whether machinery, falling trees, or construction activity has damaged any components of the sediment basin. If damage has occurred, repair it.*
  - *After each runoff event. Inspect the erosion damage at flow entry and exit points. If damage has occurred, make the necessary repairs.*
  - *At least weekly during the nominated wet season (if any); otherwise at least fortnightly.*
  - *Prior to, and immediately after, periods of 'stop work' or site 'shutdown'.*
- *Clean out accumulated sediment when it reaches the marker board/post, and restore the original storage volume as determined by the Construction Contractor. Place sediment in a disposal area or, if appropriate, mix with dry soil on the site.*
- *Do not dispose of sediment in a manner that will create an erosion or pollution hazard.*

- *Check all visible pipe connections for leaks and repair as necessary.*
- *Check fill material in the basin for excessive settlement, slumping of the slopes or piping between the conduit and the embankment, make all necessary repairs.*
- *Remove all trash and other debris from the basin and riser.*
- *Submerged inflow pipes must be inspected and de-silted (as required) after each inflow event.*

# 10. Monitoring and Maintenance

## 10.1 Water Quality Monitoring

Water quality monitoring will be undertaken during the Construction phase as outlined below, and in accordance with the relevant conditions of State Government approvals.

### 10.1.1 Receiving Waters

During construction, water quality monitoring of nominated waterways impacted by the Project is required to be undertaken in accordance within Clause 8.2.3 of MRTS52 – Erosion and Sediment Control and the *Monitoring and Sampling Manual* (DEHP, 1999). The use of field water quality meters shall be undertaken in accordance with the aforementioned *Monitoring and Sampling Manual* and any specific manufacturer's requirements relating to its use or calibration. Specifically, MRTS52 – Erosion and Sediment Control states the following in regards to water quality monitoring during construction:

- All waterbodies and waterways within the site, and all waterbodies and waterways where stormwater is discharged shall be monitored
- Monitoring shall be undertaken:
  - At least one week prior to construction activities
  - Weekly during construction activities that have potential to impact the waterbody or waterway
  - Immediately following a discharge from sediment basin and/or rain event causing runoff into the waterway or waterbody
- Monitoring shall be undertaken at a representative location upstream and downstream of the works site. Where possible, a downstream monitoring location should be no more than 100 metres downstream of the works.
- Water quality shall be analysed for the following parameters:
  - pH
  - Turbidity and/or total suspended solids
  - Dissolved oxygen
  - Electrical conductivity
  - Visual assessments for hydrocarbons and waste/litter

*The results of monitoring shall be recorded in a dedicated spreadsheet and compared against investigation criteria and previous monitoring results. The monitoring results, including results of investigations, shall be provided to TMR monthly.*

The Contractor's PESCP and EMP(C) will be developed in accordance with these requirements, including the identification of all required monitoring locations where stormwater is to be discharged.

### 10.1.2 Discharge Waters

Water discharged from ESCs to the receiving environment must comply with the water quality limits in Table 14. In addition, Clause 8.2.2 of MRTS52 – Erosion and Sediment Control states the following:

- *Waters released from sediment basins or trap must be sampled prior to release. The samples taken must be representative of the water being discharged.*
- *The water shall be analysed for:*
  - *pH*
  - *Turbidity and/or total suspended solids*
  - *Any other parameter nominated in Annexure MRTS52 Clause 4.1*
  - *Visually for hydrocarbons and litter*
- *The results of monitoring shall be recorded in a dedicated spreadsheet and compared against discharge criteria. Water above discharge criteria shall not be released other than in the case of safety reasons or where there is a demonstrable environmental benefit of releasing. The type and volume of flocculent/coagulant used (if used) shall be also recorded on this spreadsheet.*
- *Any release (purposeful or otherwise) outside of discharge criteria shall be immediately reported to the Administrator and treated as a non-conformance. Where the discharge causes or has the potential to cause environmental harm as defined by Environmental Protection Act the event shall also be reported to the regulatory authority.*
- *Where it is not possible to sample water prior to discharge or runoff from site (for example, sheet flow) visual water quality monitoring shall be undertaken. Records of the results of the visual observations shall be kept within daily inspection records.*

## 10.2 Environmental Inspections and Audits

### 10.2.1 Contractor Inspections

Environmental inspections, monitoring and reporting shall occur in accordance with Clause 7 of MRTS51 – Environmental Management and Clause 9 of MRTS52 – Erosion and Sediment Control. Erosion and sediment control inspections shall be undertaken in accordance with EHP's *Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland*.

Inspections should be conducted in accordance with Clause 7.2 of MRTS51 – Environmental Management and where specified in MRTS51.1 – Environmental Management the inspection schedule as presented in Section 7.4 of the IECA Manual. Section 7.4 of the IECA Manual states:

*Best practise site management requires all ECS measures to be inspected by the site manager, responsible ESC officer, or nominated representative:*

- *At least daily when rain is occurring*
- *At least weekly (even if work is not occurring on-site)*
- *Within 24 hours prior to expected rainfall*
- *Within 18 hours of a rainfall event of sufficient intensity and duration to cause on-site runoff*

*Daily site inspections, during periods of runoff-producing rainfall must check:*

- *All drainage, erosion and sediment control measures*
- *Occurrences of excessive sediment deposition (whether on-site or off-site)*
- *All site discharge points*

*Weekly site inspections must check:*

- *All drainage, erosion and sediment control measures*
- *Occurrences of excessive sediment deposition (whether on-site or off-site)*



- Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements
- Litter and waste receptors
- Oil, fuel and chemical storage facilities

*Site inspections immediately prior to anticipated runoff producing rainfall must check:*

- All drainage, erosion and sediment control measures
- All temporary (e.g. overnight) flow direction and drainage works

*Site inspections immediately following to anticipated runoff producing rainfall must check:*

- Treatment and de-watering requirements of sediment basins
- Sediment deposition within sediment basins and the need for its removal
- All drainage, erosion and sediment control measures
- Occurrences of excessive sediment deposition (whether onsite or offsite)
- Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements
- Occurrences of excessive erosion, sedimentation or mud generation around the site office, car park and/or material storage areas

*In addition to the above, monthly site inspections must check:*

- Surface coverage of finished surfaces (both area and percentage cover)
- Health of recently established vegetation
- Proposed staging of future land clearing, earthworks and site/soil stabilisation

## **10.2.2 Independent Audits**

As the Project has been identified to have a high erosion risk the Contractor is required to engage an independent Appropriately Qualified Person (AQP) to assess the compliance of ESC measures in accordance with Clause 9.1.2 of MRTS52 – Erosion and Sediment Control. Clause 9.1.2 requires the AQP to assess the compliance of ESC measures against MRTS52 – Erosion and Sediment Control, the approved PESCPs and nominated discharge limits.

## 10.3 Non-conformance and Corrective Actions

### 10.3.1 General

Corrective actions will be initiated where environmental outcomes and performance indicators have not been met. Where an exceedance of the performance indicators occurs the Contractor shall investigate the cause of the exceedance and where the exceedance is deemed to be a result of the construction works, it shall be treated as a non-conformance.

In the event of an incident during construction such as a contaminant spill or major discharge of sediment into the waterway, immediate actions are to be undertaken to minimise the potential impacts to aquatic fauna, and the appropriate government agency will be notified (TMR, EHP and DoE). Actions may include immediate containment and appropriate disposal of contaminant material, removal of sediment from the waterway and habitat areas, transportation of injured fauna to a wildlife carer or veterinarian and corrective measures to prevent the occurrence from reoccurring.

Where an environmental incident as a result of ESC occurs the Contractor shall implement the following corrective actions as a minimum:

- All non-conformances and incidents are to be corrected as soon as possible and strategies implemented to reduce the likelihood of the incident reoccurring
- Containment of the incident/spill using bunds or similar, approved chemicals and containment areas onsite
- The environmental representative is to review the ESC measures in place for effectiveness and check the maintenance record
- Where water quality is an issue, the Administrator is to be immediately notified by the Construction Contractor of the incident
- An incident/accident report is to be completed for all accidents, incidents and non-conformances.

### 10.3.2 Reporting

The Contractor is required to prepare a monthly report for TMR detailing any incidents of environmental nuisance and non-conformance in accordance with Clause 7.4 of MRTS51 – Environmental Management and Clause 8.2.3 of MRTS52 – Erosion and Sediment Control. TMR has a responsibility to report all major environmental incidents that risk causing environmental harm to EHP under the *Environment Protection Act 1994*.

### 10.3.3 Emergency Contacts Details

The Construction Environmental Management Plan (EMP(C)) for the Project identifies the key emergency contacts that are to be notified in the event of an environmental incident or environmental emergency. These personnel may stop works and provide directions to effectively manage emergencies.

Furthermore, the EMP(C) outlines the procedures that are to be complied with in the management of emergencies. It contains measures that ensure these procedures are implemented and maintained throughout the life of the Project.

## 10.4 Management Plan Timeframe

This ESCP is to be included in the contract documentation for the Project. The initiation of this ESCP will be commenced once the construction contract for this Project is awarded. Table 16 below provides an indicative timeframe for the implementation of this ESCP.

**Table 16: Timeframes**

<b>Timeframe</b>	<b>Task</b>
<b>Mid 2015 – early 2016</b>	Pre-construction water quality monitoring
<b>2016</b>	Construction commencement – ESCP initiated
<b>2016 and during construction</b>	Construction Contractor to develop PESCPs in accordance with this ESCP and relevant technical standards for approval by TMR. PESCPs will be monitored for their efficiency and effectiveness during the contract in accordance with Clause 6.4 of MRTS52 – Erosion and Sediment Control. Updates to the PESCPs will also occur in accordance with the aforementioned Clause.
<b>Construction phase</b>	Ongoing water quality monitoring
<b>Construction phase</b>	Contractor ESC inspections and audits
<b>Construction phase</b>	Independent ESC inspections and audits
<b>Construction phase</b>	Monthly reporting in accordance with Section 10.3.2 of this ESCP

# 11. Operational Phase Erosion and Sediment Control Objectives

Monitoring and maintenance of structures will be undertaken during the defects and maintenance period, and Operational phase as outlined below.

## 11.1 Design Criteria

Stormwater Quality Improvement Devices (SQIDs) have been included in the design as part of the Project scope with consideration of the Operational phase load-based pollutant reduction WQOs, listed in Table 17.

**Table 17: Water Quality Objectives for design of SQIDS (Water Quality Basins)<sup>1</sup>**

Pollutant type	Objective
Total suspended solids (TSS)	80%
Total phosphorus (TP)	60%
Total nitrogen (TN)	45%
Gross pollutants (≥ 5mm)	90%

<sup>1</sup> These WQOs have been adopted based on guidance provided in the Road Drainage Manual which states that Environmental Values and Water Quality Objectives are available in Schedule 1 of the *Environmental Protection (Water) Policy (2009)*. Schedule 1 of the EPP Water (2009) refers to the Mary River Environmental Values and Water Quality Objectives (Basin No. 138) (2010) document which subsequently refers to the Urban Stormwater Quality Planning Guidelines (DNRM, 2010).

Furthermore, the quality of waterways intersected by the Project will aim to achieve no more than 10% variation between the downstream and upstream monitoring locations following completion of the Project construction. Parameters considered are to include as a minimum pH, turbidity and/or suspended solids, dissolved oxygen and electrical conductivity.

## 11.2 Monitoring and Maintenance Requirements

### 11.2.1 Defects and Maintenance Period

Maintenance and inspection of SQIDs will be required at regular intervals during the defects and maintenance period, utilising a maintenance inspection checklist in accordance with relevant standard guidelines. This is to incorporate the activities detailed below (recommended timeframes during the defined maintenance period have been provided):

- Watering to establish vegetation – every 2-7 days
- Inspect for evidence of physical damage or erosion – every 3-6 months
- Checks for mosquito breeding – quarterly
- Trimming and replacement of vegetation – every 1-3 months
- Litter and debris removal – quarterly
- Inspection of controls to ensure proper function of bioretention basins (including checking for scour and sedimentation) – every 3-6 months
- Inspections for weed invasion and growth – quarterly

- Removal of accumulated sediment and re-profiling of bioretention basins

General maintenance of permanent drainage infrastructure will be undertaken throughout the defects and maintenance period in accordance with relevant legislation and guidelines. This includes removal of blockages and sediment accumulation in culverts, grass swales and other drainage infrastructure, and inspections to maintain and monitor the integrity of the infrastructure.

Monitoring of the creek diversion and rehabilitation works will be conducted in accordance with the conditions of approval from the Department of Natural Resources and Mines (DNRM), until they have achieved the performance objective for rehabilitation.

Water quality monitoring shall be conducted at a representative upstream and downstream location of the Project in each watercourse throughout the defects and maintenance period. A monitoring schedule shall be defined as the Project progresses. Where possible, the downstream location should be no more than 100m downstream of the works.

Where performance indicators or outcomes are not met, a non-conformance report is to be completed including details of the non-conformance and short and long-term preventative actions. The non-conformance report is to be issued to the Client and actioned appropriately. Additional water quality monitoring may be required in this circumstance.

### **11.2.2 Operational Phase**

General maintenance of permanent drainage infrastructure will be undertaken throughout the Operational phase in accordance with relevant legislation and guidelines, and in accordance with TMR's Road Maintenance Performance Contract or other arrangement as managed by TMR.



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- SMEC (2015c) *Supporting Document for an Application by an Entity for a Licence to Interfere with the Course of Flow – Traveston Creek*. Prepared for the Department of Natural Resources and Mines. SMEC, Brisbane.
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## **13. Appendices**

### **Appendix A - Protected Matter Search Tools 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: 27/07/15 15:08:16

## [Summary](#)

## [Details](#)

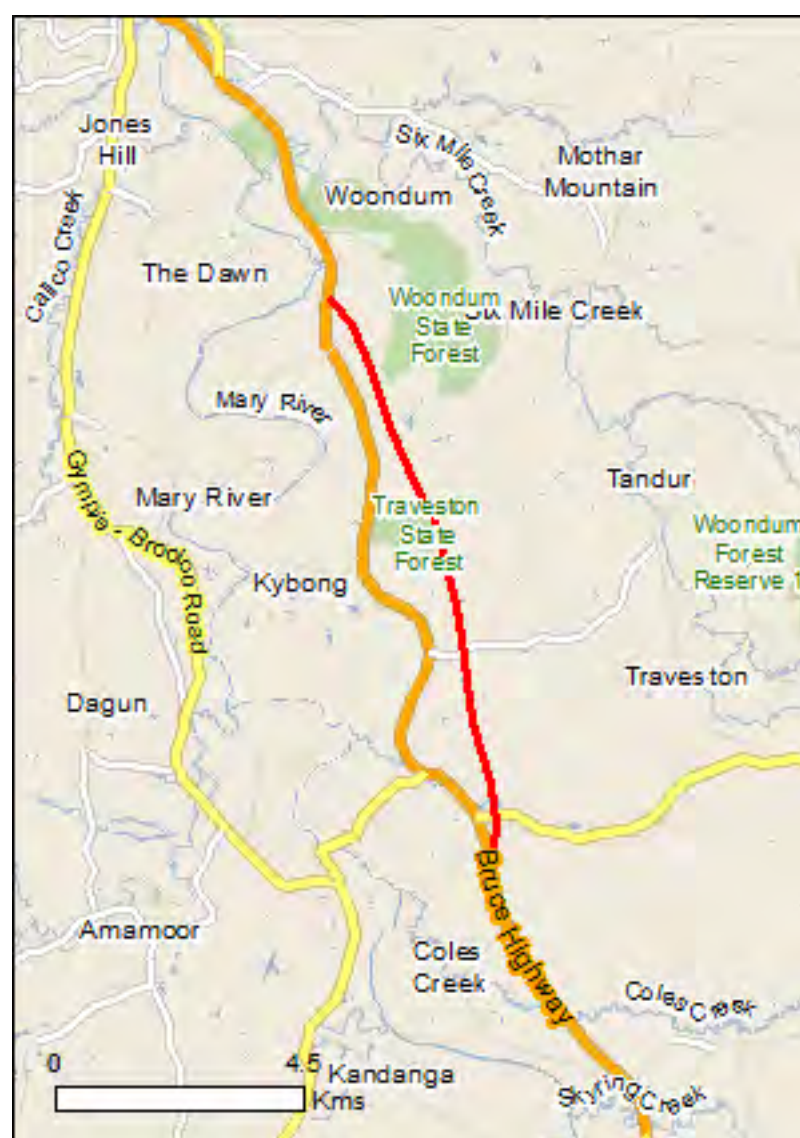
[Matters of NES](#)

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

[Extra Information](#)

## [Caveat](#)

## [Acknowledgements](#)



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

[Coordinates](#)

Buffer: 5.0Km





# 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 Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	2
<a href="#">Listed Threatened Species:</a>	37
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	35
<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)	[ Resource Information ]
Name	Proximity
<a href="#">Great sandy strait</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="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community likely to occur within area
<a href="#">White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland</a>	Critically Endangered	Community may occur within area

## Listed Threatened Species

 [ Resource Information ]

Name	Status	Type of Presence
Birds		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
<a href="#">Cyclopsitta diophthalma coxeni</a> Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
<a href="#">Erythrorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Geophs scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Poephila cincta cincta</a> Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species

Name	Status	Type of Presence
habitat known to occur within area		
<b>Fish</b>		
<a href="#">Maccullochella mariensis</a> Mary River Cod [83806]	Endangered	Species or species habitat known to occur within area
<a href="#">Neoceratodus forsteri</a> Australian Lungfish, Queensland Lungfish [67620]	Vulnerable	Species or species habitat known to occur within area
<b>Frogs</b>		
<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat known to occur within area
<b>Insects</b>		
<a href="#">Phyllodes imperialis smithersi</a> Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	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
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Archidendron lovelliae</a> Bacon Wood, Tulip Siris [13451]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Arthraxon hispidus</a> Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bosistoa selwynii</a> Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Floydia praealta</a> Ball Nut, Possum Nut, Big Nut, Beefwood [15762]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Macadamia ternifolia</a> Small-fruited Queensland Nut, Gympie Nut [7214]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat likely to occur within area
<a href="#">Phebalium distans</a> Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Sophora fraseri</a> [8836]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Thesium australe</a> Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat may occur within area
<a href="#">Triunia robusta</a> [14747]	Endangered	Species or species habitat likely to occur within area
<a href="#">Xanthostemon oppositifolius</a> Penda, Southern Penda, Luya's Hardwood [8738]	Vulnerable	Species or species habitat likely 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 may occur within area
<a href="#">Elseya albagula</a> Southern Snapping Turtle, White-throated Snapping Turtle [81648]	Critically Endangered	Species or species habitat likely to occur within area
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	Species or species habitat known to occur within area
<a href="#">Furina dunmali</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
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		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="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat known to occur within area
<b>Migratory Wetlands Species</b>		
<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]		Breeding 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="#">Pandion cristatus</a> Eastern Osprey [82411]		Species or species habitat likely to occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* 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="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<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]		Breeding 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="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat known to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species



Name	Threatened	Type of Presence
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		habitat known to occur within area  Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat known to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat likely to 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

### 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>		
<i>Acridotheres tristis</i> Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
<i>Anas platyrhynchos</i> Mallard [974]		Species or species habitat likely to occur within area
<i>Columba livia</i> Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
<i>Lonchura punctulata</i> Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
<i>Passer domesticus</i> House Sparrow [405]		Species or species habitat likely to occur within area
<i>Streptopelia chinensis</i> Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
<i>Sturnus vulgaris</i> Common Starling [389]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
<b>Frogs</b>		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area

Name	Status	Type of Presence
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Sagittaria platyphylla Delta Arrowhead, Arrowhead, Slender Arrowhead [68483]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<b>Reptiles</b>		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

# Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

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# 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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Report created: 02/08/15 17:59:45

## [Summary](#)

## [Details](#)

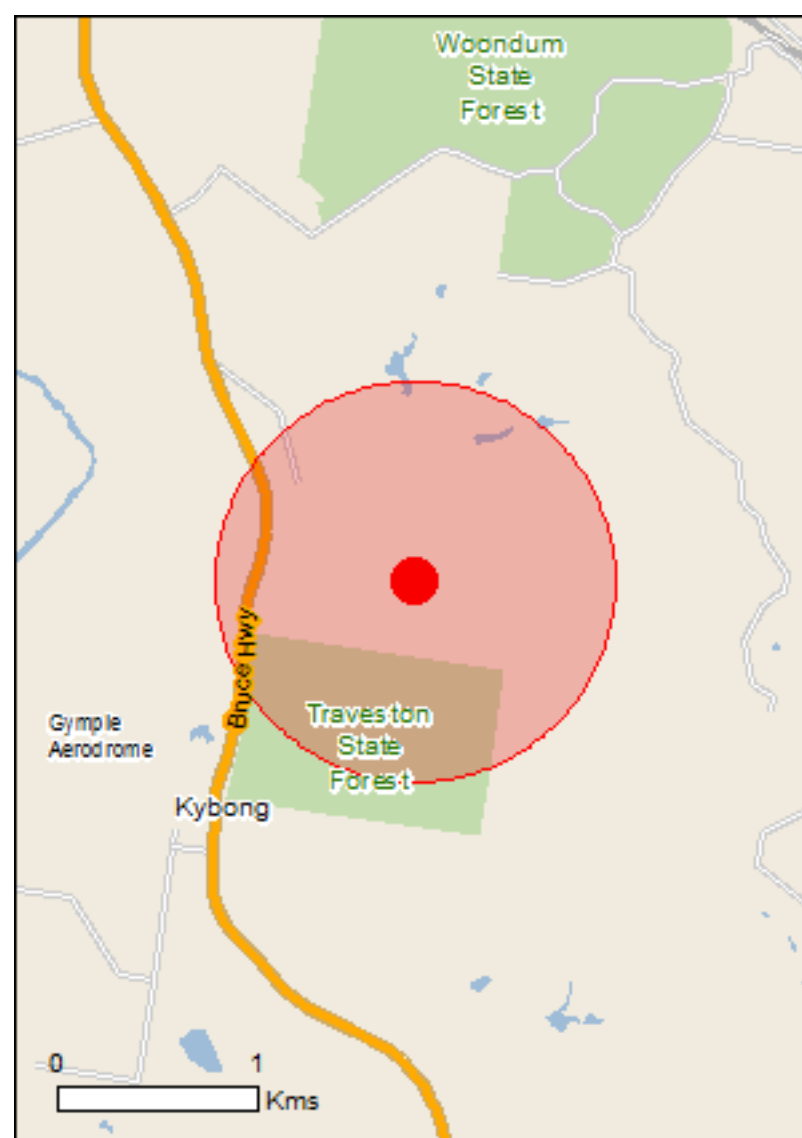
[Matters of NES](#)

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

[Extra Information](#)

## [Caveat](#)

## [Acknowledgements](#)



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[Coordinates](#)

Buffer: 1.0Km



# Summary

## Matters of National Environmental Significance

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<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 Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	1
<a href="#">Listed Threatened Species:</a>	29
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	33
<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)

[\[ Resource Information \]](#)

Name	Proximity
<a href="#">Great sandy strait</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="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community may occur within area

### Listed Threatened Species

[\[ Resource Information \]](#)

Name	Status	Type of Presence
<b>Birds</b>		
<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
<a href="#">Cyclopsitta diophthalma coxeni</a> Coxen's Fig-Parrot [59714]	Endangered	Species or species habitat may occur within area
<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
<a href="#">Erythrorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Poephila cincta cincta</a> Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area

Name	Status	Type of Presence
<b>Frogs</b>		
<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
<b>Insects</b>		
<a href="#">Phyllodes imperialis smithersi</a> Pink Underwing Moth [86084]	Endangered	Species or species habitat may occur within area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	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
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Archidendron lovelliae</a> Bacon Wood, Tulip Siris [13451]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Arthraxon hispidus</a> Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bosistoa selwynii</a> Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
<a href="#">Phebalium distans</a> Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Sophora fraseri</a> [8836]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Triunia robusta</a> [14747]	Endangered	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area

Name	Status	Type of Presence
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	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
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#### Migratory Marine Birds

<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
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#### Migratory Terrestrial Species

<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
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<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
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<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
--	--	---

<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
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<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
--	--	--

<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
---	--	--

#### Migratory Wetlands Species

<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
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<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
--	--	--

<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
--	--	--

<a href="#">Pandion cristatus</a> Eastern Osprey [82411]		Species or species habitat may occur within area
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## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* 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="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<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 likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may 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 likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

### Invasive Species

[ [Resource Information](#) ]

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

Name	Status	Type of Presence
<b>Birds</b>		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False		Species or species

Name	Status	Type of Presence
Ragweed [19566]		habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Salvinia molesta Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]		Species or species habitat likely to occur within area
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
<b>Reptiles</b>		
Hemidactylus frenatus Asian House Gecko [1708]		Species or species habitat likely to occur within area

# Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-26.2807 152.71947



# 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.



# 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: 02/08/15 18:00:45

[Summary](#)

[Details](#)

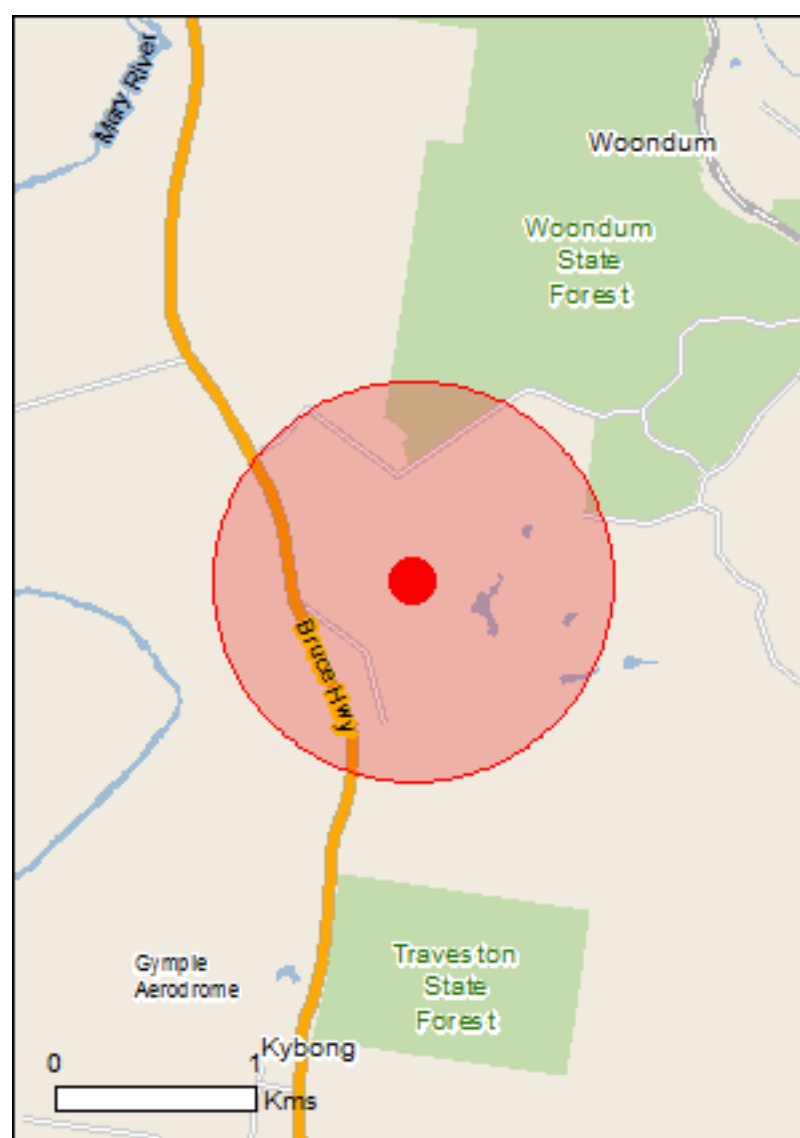
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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

[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 Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	1
<a href="#">Listed Threatened Species:</a>	27
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	33
<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="#">Great sandy strait</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="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community may occur within area

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

Name	Status	Type of Presence
------	--------	------------------

### Birds

<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
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<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
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<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
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<a href="#">Erythrotriorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
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<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
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<a href="#">Poephila cincta cincta</a> Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
---	------------	--

<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

### Frogs

<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within
--	------------	---

Name	Status	Type of Presence area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	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
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Archidendron lovelliae</a> Bacon Wood, Tulip Siris [13451]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Arthraxon hispidus</a> Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bosistoa selwynii</a> Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
<a href="#">Phebalium distans</a> Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Triunia robusta</a> [14747]	Endangered	Species or species habitat likely to occur within area
<b>Reptiles</b>		
<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 may occur within area
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	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
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a>		
Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundapus caudacutus</a>		
White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a>		
Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a>		
Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a>		
Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a>		
Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a>		
Rufous Fantail [592]		Species or species habitat likely to occur within area

## Migratory Wetlands Species

<a href="#">Ardea alba</a>		
Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a>		
Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a>		
Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Pandion cristatus</a>		
Eastern Osprey [82411]		Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

### 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="#">Anseranas semipalmata</a>		
Magpie Goose [978]		Species or species habitat may occur within area
<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 likely to occur

Name	Threatened	Type of Presence within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may 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 likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

### Invasive Species

### [ [Resource Information](#) ]

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

Name	Status	Type of Presence
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Name	Status	Type of Presence
<b>Birds</b>		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species

Name	Status	Type of Presence
habitat likely to occur within area		
<b>Plants</b>		
<p><i>Annona glabra</i> Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]</p>		Species or species habitat likely to occur within area
<p><i>Asparagus africanus</i> Climbing Asparagus, Climbing Asparagus Fern [66907]</p>		Species or species habitat likely to occur within area
<p><i>Asparagus plumosus</i> Climbing Asparagus-fern [48993]</p>		Species or species habitat likely to occur within area
<p><i>Cabomba caroliniana</i> Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]</p>		Species or species habitat likely to occur within area
<p><i>Chrysanthemoides monilifera</i> Bitou Bush, Boneseed [18983]</p>		Species or species habitat may occur within area
<p><i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> Bitou Bush [16332]</p>		Species or species habitat likely to occur within area
<p><i>Dolichandra unguis-cati</i> Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]</p>		Species or species habitat likely to occur within area
<p><i>Hymenachne amplexicaulis</i> Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]</p>		Species or species habitat likely to occur within area
<p><i>Lantana camara</i> Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]</p>		Species or species habitat likely to occur within area
<p><i>Parthenium hysterophorus</i> Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]</p>		Species or species habitat likely to occur within area
<p><i>Protasparagus plumosus</i> Climbing Asparagus-fern, Ferny Asparagus [11747]</p>		Species or species habitat likely to occur within area
<p><i>Salix</i> spp. except <i>S.babylonica</i>, <i>S.x calodendron</i> &amp; <i>S.x reichardtii</i> Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]</p>		Species or species habitat likely to occur within area
<p><i>Salvinia molesta</i> Salvinia, Giant Salvinia, Aquarium Watermoss, Kariba Weed [13665]</p>		Species or species habitat likely to occur within area
<p><i>Senecio madagascariensis</i> Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]</p>		Species or species habitat likely to occur within area
<b>Reptiles</b>		
<p><i>Hemidactylus frenatus</i> Asian House Gecko [1708]</p>		Species or species habitat likely to occur within area

# Caveat

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

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

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

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

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

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

- migratory and
- marine

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

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

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

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

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

# Coordinates

-26.27105 152.71552



# 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.



# 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: 02/08/15 17:51:15

[Summary](#)

[Details](#)

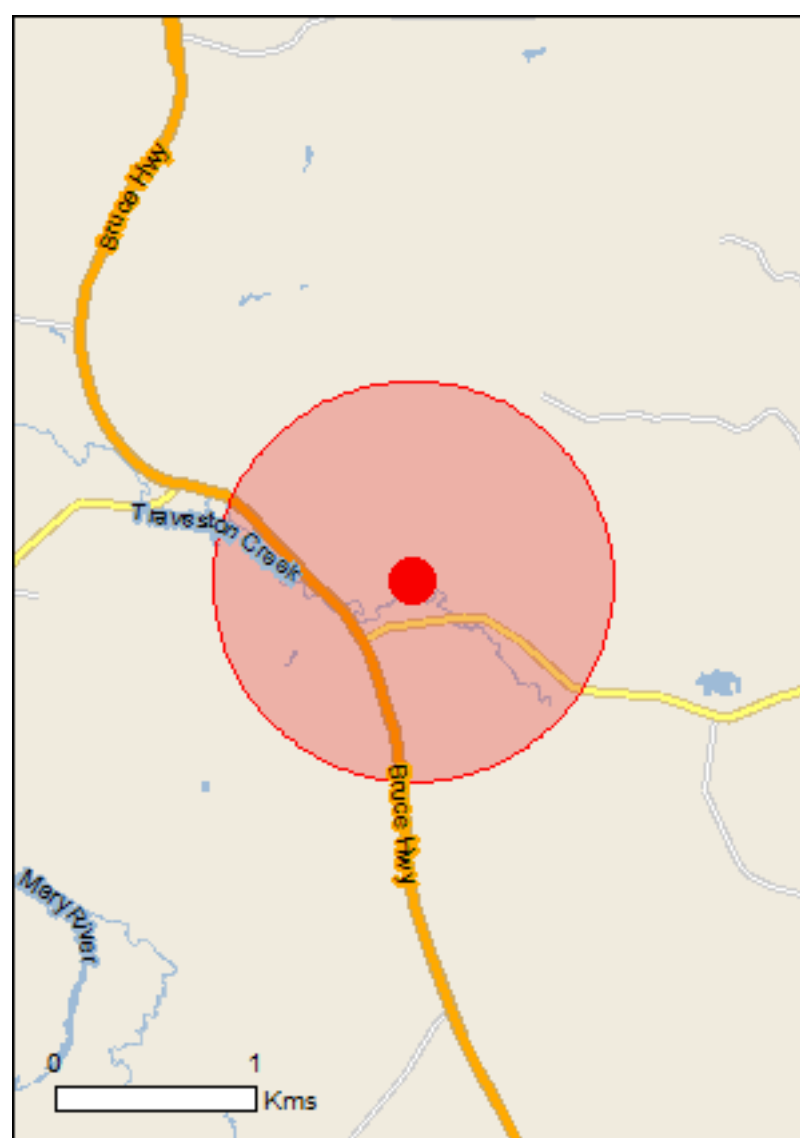
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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

[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 Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	1
<a href="#">Listed Threatened Species:</a>	24
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	33
<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)	[ Resource Information ]
Name	Proximity
<a href="#">Great sandy strait</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="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community may occur within area

## Listed Threatened Species

[ Resource Information ]

Name	Status	Type of Presence
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### Birds

<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
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<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
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<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
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<a href="#">Erythrorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
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<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
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<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
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<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
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### Frogs

<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within area
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### Mammals

<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species
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Name	Status	Type of Presence
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	habitat may occur within area 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
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Arthraxon hispidus</a> Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bosistoa selwynii</a> Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
<a href="#">Phebalium distans</a> Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Triunia robusta</a> [14747]	Endangered	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	Species or species habitat likely to occur within area
<a href="#">Furina dunmalli</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<b>Listed Migratory Species</b>		<b>[ Resource Information ]</b>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species



Name	Threatened	Type of Presence
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		habitat likely to occur within area  Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<b>Migratory Wetlands Species</b>		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may occur within area
<a href="#">Gallinago hardwickii</a> Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
<a href="#">Pandion cristatus</a> Eastern Osprey [82411]		Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species	<a href="#">[ Resource Information ]</a>	
* 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="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<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 likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Species or species habitat may 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

Name	Threatened	Type of Presence
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		habitat likely to occur within area  Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat known to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

### Invasive Species

[\[ Resource Information \]](#)

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

Name	Status	Type of Presence
<b>Birds</b>		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur

Name	Status	Type of Presence within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple, Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311]		Species or species habitat likely to occur within area
Asparagus africanus Climbing Asparagus, Climbing Asparagus Fern [66907]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Asparagus plumosus Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
Cabomba caroliniana Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171]		Species or species habitat likely to occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Dolichandra unguis-cati Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
Hymenachne amplexicaulis Hymenachne, Olive Hymenachne, Water Stargrass, West Indian Grass, West Indian Marsh Grass [31754]		Species or species habitat likely to occur within area
Lantana camara Lantana, Common Lantana, Kamara Lantana, Large-leaf Lantana, Pink Flowered Lantana, Red Flowered Lantana, Red-Flowered Sage, White Sage, Wild Sage [10892]		Species or species habitat likely to occur within area
Parthenium hysterophorus Parthenium Weed, Bitter Weed, Carrot Grass, False Ragweed [19566]		Species or species habitat likely to occur within area
Protasparagus plumosus Climbing Asparagus-fern, Ferny Asparagus [11747]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
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# Coordinates

-26.3271 152.73187



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# 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: 02/08/15 17:55:15

[Summary](#)

[Details](#)

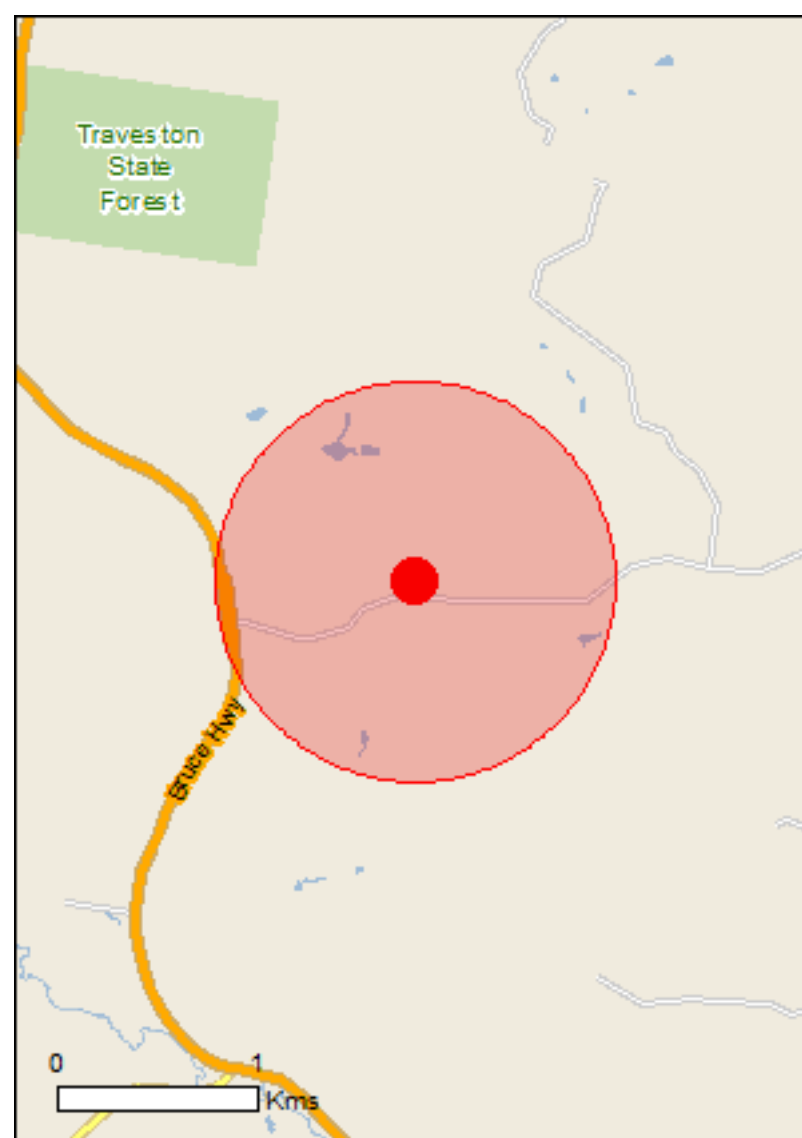
[Matters of NES](#)

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

[Extra Information](#)

[Caveat](#)

[Acknowledgements](#)



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

[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 Area:</a>	None
<a href="#">Listed Threatened Ecological Communities:</a>	1
<a href="#">Listed Threatened Species:</a>	26
<a href="#">Listed Migratory Species:</a>	11

## Other Matters Protected by the EPBC Act

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

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

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>	None
<a href="#">Commonwealth Heritage Places:</a>	None
<a href="#">Listed Marine Species:</a>	15
<a href="#">Whales and Other Cetaceans:</a>	None
<a href="#">Critical Habitats:</a>	None
<a href="#">Commonwealth Reserves Terrestrial:</a>	None
<a href="#">Commonwealth Reserves Marine:</a>	None

## Extra Information

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

<a href="#">State and Territory Reserves:</a>	None
<a href="#">Regional Forest Agreements:</a>	None
<a href="#">Invasive Species:</a>	33
<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="#">Great sandy strait</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="#">Lowland Rainforest of Subtropical Australia</a>	Critically Endangered	Community may occur within area

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

Name	Status	Type of Presence
------	--------	------------------

### Birds

<a href="#">Anthochaera phrygia</a> Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
--	-----------------------	--

<a href="#">Botaurus poiciloptilus</a> Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area
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<a href="#">Dasyornis brachypterus</a> Eastern Bristlebird [533]	Endangered	Species or species habitat may occur within area
---	------------	--

<a href="#">Erythrorchis radiatus</a> Red Goshawk [942]	Vulnerable	Species or species habitat likely to occur within area
--	------------	--

<a href="#">Geophaps scripta scripta</a> Squatter Pigeon (southern) [64440]	Vulnerable	Species or species habitat may occur within area
--	------------	--

<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
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<a href="#">Poephila cincta cincta</a> Black-throated Finch (southern) [64447]	Endangered	Species or species habitat may occur within area
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<a href="#">Rostratula australis</a> Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
--	------------	--

<a href="#">Turnix melanogaster</a> Black-breasted Button-quail [923]	Vulnerable	Species or species habitat likely to occur within area
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### Frogs

<a href="#">Mixophyes iteratus</a> Giant Barred Frog, Southern Barred Frog [1944]	Endangered	Species or species habitat may occur within
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Name	Status	Type of Presence area
<b>Mammals</b>		
<a href="#">Chalinolobus dwyeri</a> Large-eared Pied Bat, Large Pied Bat [183]	Vulnerable	Species or species habitat may occur within area
<a href="#">Dasyurus hallucatus</a> Northern Quoll [331]	Endangered	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
<a href="#">Pteropus poliocephalus</a> Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
<b>Plants</b>		
<a href="#">Archidendron lovelliae</a> Bacon Wood, Tulip Siris [13451]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Arthraxon hispidus</a> Hairy-joint Grass [9338]	Vulnerable	Species or species habitat may occur within area
<a href="#">Bosistoa selwynii</a> Heart-leaved Bosistoa [13702]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Bosistoa transversa</a> Three-leaved Bosistoa, Yellow Satinheart [16091]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Cryptocarya foetida</a> Stinking Cryptocarya, Stinking Laurel [11976]	Vulnerable	Species or species habitat may occur within area
<a href="#">Fontainea rostrata</a> [24039]	Vulnerable	Species or species habitat likely to occur within area
<a href="#">Phaius australis</a> Lesser Swamp-orchid [5872]	Endangered	Species or species habitat may occur within area
<a href="#">Phebalium distans</a> Mt Berryman Phebalium [81869]	Critically Endangered	Species or species habitat may occur within area
<a href="#">Triunia robusta</a> [14747]	Endangered	Species or species habitat may occur within area
<b>Reptiles</b>		
<a href="#">Delma torquata</a> Collared Delma [1656]	Vulnerable	Species or species habitat may occur within area
<a href="#">Elusor macrurus</a> Mary River Turtle, Mary River Tortoise [64389]	Endangered	Species or species habitat likely to occur within area
<a href="#">Furina dunmali</a> Dunmall's Snake [59254]	Vulnerable	Species or species habitat may occur within area
<b>Listed Migratory Species</b>		<b>[ Resource Information ]</b>
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence



Name	Threatened	Type of Presence
<b>Migratory Marine Birds</b>		
<a href="#">Apus pacificus</a> Fork-tailed Swift [678]		Species or species habitat likely to occur within area
<b>Migratory Terrestrial Species</b>		
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Merops ornatus</a> Rainbow Bee-eater [670]		Species or species habitat may occur within area
<a href="#">Monarcha melanopsis</a> Black-faced Monarch [609]		Species or species habitat known to occur within area
<a href="#">Monarcha trivirgatus</a> Spectacled Monarch [610]		Species or species habitat likely to occur within area
<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area

<b>Migratory Wetlands Species</b>		
<a href="#">Ardea alba</a> Great Egret, White Egret [59541]		Species or species habitat likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Breeding 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="#">Pandion cristatus</a> Eastern Osprey [82411]		Species or species habitat may occur within area

## Other Matters Protected by the EPBC Act

Listed Marine Species		[ <a href="#">Resource Information</a> ]
* 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="#">Anseranas semipalmata</a> Magpie Goose [978]		Species or species habitat may occur within area
<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 likely to occur within area
<a href="#">Ardea ibis</a> Cattle Egret [59542]		Breeding likely to occur within area

Name	Threatened	Type of Presence
<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 likely to occur within area
<a href="#">Hirundapus caudacutus</a> White-throated Needletail [682]		Species or species habitat likely to occur within area
<a href="#">Lathamus discolor</a> Swift Parrot [744]	Endangered	Species or species habitat likely to occur within area
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<a href="#">Myiagra cyanoleuca</a> Satin Flycatcher [612]		Species or species habitat likely to occur within area
<a href="#">Pandion haliaetus</a> Osprey [952]		Species or species habitat may occur within area
<a href="#">Rhipidura rufifrons</a> Rufous Fantail [592]		Species or species habitat likely to occur within area
<a href="#">Rostratula benghalensis (sensu lato)</a> Painted Snipe [889]	Endangered*	Species or species habitat may occur within area

## Extra Information

### Invasive Species

[ [Resource Information](#) ]

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

Name	Status	Type of Presence
<b>Birds</b>		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Lonchura punctulata Nutmeg Mannikin [399]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
<b>Frogs</b>		
Rhinella marina Cane Toad [83218]		Species or species habitat likely to occur within area
<b>Mammals</b>		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
<b>Plants</b>		
Annona glabra Pond Apple, Pond-apple Tree, Alligator Apple,		Species or species

Name	Status	Type of Presence
Bullock's Heart, Cherimoya, Monkey Apple, Bobwood, Corkwood [6311] <i>Asparagus africanus</i>		habitat likely to occur within area
Climbing Asparagus, Climbing Asparagus Fern [66907]  <i>Asparagus plumosus</i> Climbing Asparagus-fern [48993]		Species or species habitat likely to occur within area
<i>Cabomba caroliniana</i> Cabomba, Fanwort, Carolina Watershield, Fish Grass, Washington Grass, Watershield, Carolina Fanwort, Common Cabomba [5171] <i>Chrysanthemoides monilifera</i> Bitou Bush, Boneseed [18983]		Species or species habitat likely to occur within area
<i>Chrysanthemoides monilifera</i> subsp. <i>rotundata</i> Bitou Bush [16332]		Species or species habitat likely to occur within area
<i>Dolichandra unguis-cati</i> Cat's Claw Vine, Yellow Trumpet Vine, Cat's Claw Creeper, Funnel Creeper [85119]		Species or species habitat likely to occur within area
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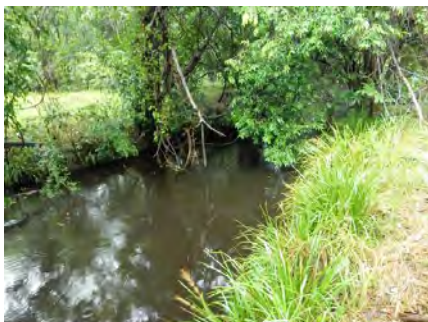
Please feel free to provide feedback via the [Contact Us](#) page.

## Appendix B - SMEC 2015d Results of Aquatic Surveys

Name of Waterway: Traveston Creek 1		Site ID: Traveston 1	
Stream Order: 3	Lat: -26.328	Long: 152.73255	
DAF Classification: Red			
Location in relation to design:		Centreline of project area	
Channel characteristics		Site Description	
Channel type	Creek	Lomandra, Lantana, forest red gum, native & exotic grasses, weeping lilly pilly	
Channel habitat	Pool/Glide		
Average wetted width	5m		
Average depth	1.5m		
Bank full width	6m		
Bank height	2.5m		
Length of reach	40m		
Flow category	Perennial		
Instream habitat			Platypus and MNES habitat potential
Dominant substrate	Silt	Platypus – deep pool, habitat 1-5m, undercut banks, soft sediment banks, large woody debris Mary River turtle– No sand banks, no riffles, deep pool, with significant barriers downstream Mary River cod– deep pool, large woody debris, roots, however significant barriers downstream	
Substrate complexity	Simple		
Instream cover	12%		
Macrophyte coverage	0%		
LWD	15%		
Habitat complexity	Run %		Pool % 50
	Riffle %		Glide % 50
Surrounding environment			
Regional ecosystem status	Not mapped as RE		
Canopy cover	70%		
Upstream barriers	Farm dam, culvert under old Traveston Road		
Downstream barriers	Concrete weir, collapsed culvert 300m downstream, culvert under Bruce Highway 500m downstream		
Adjacent land use	Grazing		
Stream condition (1-10)	8		
Riparian condition (1-10)	6		

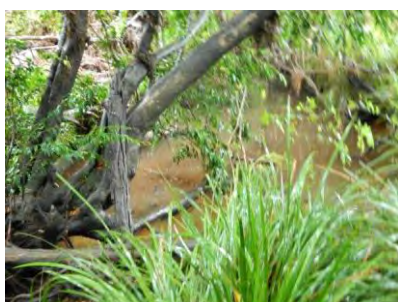


Name of Waterway: Traveston Creek 2		Site ID: Traveston 2	
Stream Order: 3	Lat: -26.32778	Long: 152.73225	
DAF Classification: Red			
Location in relation to design:	100m downstream		
Channel characteristics		Site Description	
Channel type	Creek	Deep pool. Lots of under cut bank Some large woody debris. Tree Roots	
Channel habitat	Pool		
Average wetted width	12m		
Average depth	1.5m		
Bank full width	14m		
Bank height	3.5m		
Length of reach	40m		
Flow category	Perennial		
Instream habitat		Platypus and MNES habitat potential	
Dominant substrate	Silt	Platypus – deep pool Mary River turtle– No sand banks, no riffles, deep pool, with significant barriers downstream Mary River cod– deep pool, large woody debris, roots, however significant barriers downstream	
Substrate complexity	pool		
Instream cover	5%		
Macrophyte coverage	0%		
LWD	5%		
Habitat complexity	Run %		Pool % 100
	Riffle %		Glide % 0
Surrounding environment			
Regional ecosystem status	Not mapped as RE		
Canopy cover	50%		
Upstream barriers	Farm dam, culvert under old Traveston Road		
Downstream barriers	Concrete weir, collapsed culvert 200m downstream, culvert under Bruce Highway 400m downstream		
Adjacent land use	Grazing		
Stream condition (1-10)	8		
Riparian condition (1-10)	4		





Name of Waterway: Traveston Creek 3		Site ID: Traveston 3
Stream Order: 3	Lat: -26.32775	Long: 152.73256
DAF Classification: Red		
Location in relation to design:	300m downstream	
Channel characteristics		Site Description
Channel type	River/Creek/Drainage	Weir and culvert. Sedimentation from bank Erosion. Culvert, weir, erosion are stresses from D/S of site.
Channel habitat	Run/Riffle/Pool/Glide	
Flow category	Perennial/Ephemeral	
Instream habitat		Platypus and MNES habitat potential
Dominant substrate	Mix of Bedrock/ Cobble/ Gravel/ Sand/ Silt	Barrier to movement and upstream migration.
Substrate complexity	Mix of Complex/ Moderate/Simple	
Surrounding environment		
Regional ecosystem status	NA	
Canopy cover	50%	
Upstream barriers	Barrier at survey site	
Downstream barriers	Concrete weir, collapsed culvert, culvert under Bruce Highway downstream	
Adjacent land use	Grazing	
Stream condition (1-10)	8	
Riparian condition (1-10)	4	





Name of Waterway: Kybong Creek 1		Site ID: Kybong 1
Stream Order: 3	Lat: 26.30288	Long: 152.72807
DAF Classification: Red		
Location in relation to design:	Within Project area	
Channel characteristics		Site Description
Channel type	Creek	Undercut banks LWD Turbid water Well shaded Lomandra, fish tail fern, pink bloodwood, foam bark, iron bark, swamp box, lantana, forest red gum
Channel habitat	Pool	
Average wetted width	3m	
Average depth	<0.5m	
Bank full width	6m	
Bank height	2m	
Length of reach	35m	
Flow category	Perennial	
Instream habitat		Platypus and MNES habitat potential
Dominant substrate	Bedrock/Silt	
Substrate complexity	Moderate/Simple	
Instream cover	15%	
Macrophyte coverage	0%	
LWD	10%	
Habitat complexity	Run %	Pool %50
	Riffle %	Glide %50
Surrounding environment		
Regional ecosystem status	<b>12.3.11</b>	
Canopy cover	70%	
Upstream barriers	Culvert under Tandur Road	
Downstream barriers	Downstream dam	
Adjacent land use	Grazing, residential, farming	
Stream condition (1-10)	8	
Riparian condition (1-10)	8	



Name of Waterway: Kybong Creek 2		Site ID: Kybong 2
Stream Order: 3	Lat: -26.30284	Long: 152.72743
DAF Classification: Red		
Location in relation to design:		Downstream of Project area
Channel characteristics		Site Description
Channel type	River/Creek/Drainage	Very narrow 2m Incised channel Fragmented pool habitat Lots of large woody debris Bridge/brick barrier in creek
Channel habitat	Run/Riffle/Pool/Glide	
Flow category	Perennial/Ephemeral	
Instream habitat		Platypus and MNES habitat potential
Dominant substrate	Cobble/Sand	Barrier to movement and upstream migration.
Substrate complexity	Complex	
Surrounding environment		
Regional ecosystem status	12.3.11	
Upstream barriers	Culvert under Tandur Road	
Downstream barriers	Downstream dam	
Adjacent land use	Grazing, residential, farming	

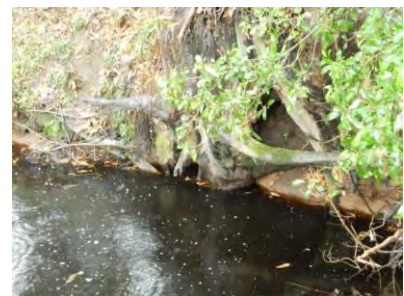




Name of Waterway: Kybong Creek 3		Site ID: Kybong 3
Stream Order: 3	Lat: -26.30288	Long: 152.72807
DAF Classification: Red		
Location in relation to design:	100m downstream	
Channel characteristics		Site Description
Channel type	River/Creek/Drainage	High sediment load in water due to clayey soils Lots of large woody debris Well-developed riparian edge Root wads Fragmented pool habitat Platypus and MNES habitat potential Marginal quality
Channel habitat	Run/Riffle/Pool/Glide	
Average wetted width	2m	
Bank height	3m	
Flow category	Perennial/Ephemeral	
Instream habitat		
Dominant substrate	Bedrock/ Cobble/ Gravel/ Sand/ Silt	
Substrate complexity	Complex	
Surrounding environment		
Regional ecosystem status	12.3.11	
Upstream barriers	Culvert under Tandur Road	
Downstream barriers	Downstream dam	
Adjacent land use	Grazing, residential, farming	



Name of Waterway: Cobbs Gully 1		Site ID: Cobbs 1
Stream Order: 2	Lat: -26.28063	Long: 152.71985
DAF Classification: Amber		
Location in relation to design:		Within Project area
Channel characteristics		Site Description
Channel type	Creek	Swamp box Tree roots Shallow pools Stagnant water
Channel habitat	Pool/Glide	
Average wetted width	4m	
Average depth	0.5m	
Bank full width	8m	
Bank height	3m	
Length of reach	50m	
Flow category	Perennial	
Instream habitat		Platypus and MNES habitat potential
Dominant substrate	Silt	Platypus – Soft banks, tree roots, shallow pools, stagnant water MRF – no sand bank, no riffles, no deep pod, poorly oxygenated water MRT – Shallow pools, some large woody debris, stagnant water, lots of litter in water Marginal habitat for all 3 species
Substrate complexity	Simple	
Instream cover	10%	
Macrophyte coverage	0%	
LWD	10%	
Habitat complexity	Run %	
	Riffle %	Glide % 50
Surrounding environment		
Regional ecosystem status	Not mapped as RE	
Canopy cover	60%	
Upstream barriers	Dam	
Downstream barriers	Dam	
Adjacent land use	Disturbed Grazing Land	
Stream condition (1-10)	5	
Riparian condition (1-10)	7	





April 2015

Name of Waterway: Cobbs Gully 2		Site ID: Cobbs 2	
Stream Order: 2	Lat: -26.28069	Long:152.71910	
DAF Classification: Amber			
Location in relation to design:		Downstream of Project area	
Channel characteristics		Site Description	
Channel type	Creek	Complex habitat – tree roots LWD Undercut banks Dark tannins in water	
Channel habitat	Pool/Glide		
Average wetted width	3m		
Flow category	Perennial/Ephemeral		
Instream habitat		Platypus and MNES habitat potential	
Dominant substrate	Silt	Marginal habitat for all 3 species	
Substrate complexity	Simple		
Instream cover	10%		
Macrophyte coverage	0%		
LWD	10%		
Habitat complexity	Run %		Pool % 50
	Riffle %		Glide % 50
Surrounding environment			
Regional ecosystem status	Not mapped as RE		
Upstream barriers	Dam		
Downstream barriers	Dam		
Adjacent land use	Disturbed Grazing Land		
Stream condition (1-10)	5		
Riparian condition (1-10)	7		



Name of Waterway: Cobbs Gully 3		Site ID: Cobbs 3
Stream Order: 2	Lat: -26.28063	Long: 152.71985
DAF Classification: Amber		
Location in relation to design:	100m downstream of Project area	
Channel characteristics		Site Description
Channel type	Creek	Sediment in water Large woody debris Series of fragmented pools Heavy sediment load in water Water stagnant Impacted by cattle Undercut banks Well shaded Fragmented pools
Channel habitat	Pool/Glide	
Average depth	0.5m	
Flow category	Perennial/Ephemeral	
Instream habitat		Platypus and MNES habitat potential
Dominant substrate	Bedrock/ Cobble/ Gravel/ Sand/ Silt	Marginal habitat for all 3 species
Substrate complexity	Complex/ Moderate/ Simple	
Macrophyte coverage	<5%	
Surrounding environment		
Regional ecosystem status	Not mapped as RE	
Canopy cover	60%	
Upstream barriers	Dam	
Downstream barriers	Dam	
Adjacent land use	Disturbed Grazing Land	



Name of Waterway: Jackass Creek 1		Site ID: Jackass 1	
Stream Order: 2	Lat: -26.270754	Long: 152.715406	
DAF Classification: Amber			
Location in relation to design:		Within Project area	
Channel characteristics		Site Description	
Channel type	Creek	<b>Swamp box</b> Lantana Lomandra sp Bracken fern Blue Billy goat weed acacia	
Channel habitat	Pool/Glide		
Average wetted width	2m		
Average depth	0.5m		
Bank full width	6m		
Bank height	2.5m		
Flow category	Perennial		
Instream habitat		Platypus and MNES habitat potential	
Dominant substrate	Silt	Marginal habitat for all 3 species	
Substrate complexity	Simple		
Instream cover	10%		
Macrophyte coverage	0%		
LWD	10%		
Habitat complexity	Run %		Pool % 50
	Riffle %		Glide % 50
Surrounding environment			
Regional ecosystem status	Not mapped as RE- acacia regrowth		
Canopy cover	25%		
Upstream barriers	Culvert under private access		
Downstream barriers	Dam, culvert under Woondum Road, culvert under Bruce Highway		
Adjacent land use	Landscape supply – disturbed riparian		





April 2015

Name of Waterway: Jackass Creek 2		Site ID: Jackass 2			
Stream Order: 2	Lat: -26.27133	Long: 152.71359			
DAF Classification: Amber					
Location in relation to design:		200m downstream of Project area			
Channel characteristics		Site Description			
Channel type	Creek	Swamp box Tree roots Shallow pools Stagnant water			
Channel habitat	Pool/Glide				
Average wetted width	4m				
Average depth	1m				
Bank full width	6m				
Bank height	2m				
Length of reach	75m				
Flow category	Perennial				
Instream habitat		Platypus and MNES habitat potential			
Dominant substrate	Silt	Marginal habitat for all 3 species			
Substrate complexity	Simple				
Instream cover	20%				
Macrophyte coverage	10%				
LWD	10%				
Habitat complexity	Run %			Pool % 50	
	Riffle %			Glide % 50	
Surrounding environment					
Regional ecosystem status		Not mapped as RE			
Canopy cover		30			
Upstream barriers		Culvert under private access			
Downstream barriers		Dam, culvert under Woondum Road, culvert under Bruce Highway			
Adjacent land use		Disturbed riparian			
Stream condition (1-10)		7			
Riparian condition (1-10)		5			

## Appendix C - MRTS 52 Erosion and Sediment Control



**Technical Specification**

**Transport and Main Roads Specifications  
MRTS52 Erosion and Sediment Control**

**January 2015**



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## 1 Introduction

This technical specification:

- applies to the control of erosion and sediment during investigation for and construction of transport infrastructure projects,
- shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements*, MRTS51 *Environmental Management*, MRTS16 *Landscape and Revegetation Works* and other technical specifications as appropriate, and
- forms part of the Principal's Specifications.

Transport and Main Roads encourages the early installation of permanent drainage and water quality controls for use as construction erosion and sediment controls where appropriate. Where permanent controls are to be used the relevant project drawings and technical specification shall take precedence over the design requirements within this specification, however the performance requirements and intent of this specification must be adhered to.

This technical specification has not been designed to be used for marine or boating infrastructure projects.

### 1.1 Relationship to other documentation

Where other contractual or statutory requirements applicable to the project demand higher standards of environmental management, the higher standards shall be adopted, where applicable.

This includes but is not limited to:

- conditions of any environmental approvals or licences obtained by Principal or Contractor for this Contract, and
- Department of Environment and Heritage Protection (DEHP) *Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland*.

Clause 1 of MRTS51 Annexure provides information on environmental approvals and/or licences obtained by the Principal that may have erosion and sediment control conditions. The Contractor shall be responsible for identifying and obtaining any other licences and permits that are required.

### 1.2 Departure from standards

The requirements and recommendations set out in this technical specification should not be inferred to preclude innovative or alternative solutions that provide improved value for money outcomes that meet the intent and principles of this specification.

Where departures are proposed (due to an approved innovation proposal or due to other restrictions) the Contractor must clearly state the departures from standards within the tender submission. This departure must have prior agreement from the Principal.

For significant departures the Contractor is encouraged to use the Guided Tender Alternative method and obtain in principal agreement prior to submission of tender. All Transport and Main Roads Transport Infrastructure Contracts (TIC) require that deviations agreed prior to contract award are recorded within the Schedule of Deviations.

It must be noted that insufficient space within the road reserve or challenging topographic conditions is not in itself a reason for departures from the standard. With appropriate staging, areas within the works footprint can be used for temporary controls, sediment basin sizes can be reduced through the use of high efficiency sediment basins, or adjacent land can be obtained through rent or other prior agreement. The Contractor is responsible for obtaining any necessary areas. In some instances the Principal may have pre-negotiated areas for use for sediment and erosion control. Details of these areas and requirements are given in Annexure MRTS52 Clause 1. The Contractor must be aware of and abide by the Notification of Entry requirements contained within General Conditions of Contract.

The Contractor is responsible for temporary erosion and sediment control and for ensuring that controls are adequately designed, installed, adapted, maintained and decommissioned.

### 1.3 Project risk

For the purposes of the management requirements required to be employed under this specification, the project is deemed to have the Erosion Risk identified in Table 1 unless otherwise nominated in Clause 2 of Annexure MRTS52.

**Table 1 - Erosion Risk Level**

Erosion Risk	Characteristics of risk level
Low	<ul style="list-style-type: none"> <li>• &lt; 2500 m<sup>2</sup> disturbed surface area open at any one time OR &lt; 10 t/ha/year soil loss predicted (using RUSLE), and</li> <li>• controls installed and maintained in accordance with prescriptive standard (e.g. standard drawings).</li> </ul>
General	<ul style="list-style-type: none"> <li>• all projects not meeting the characteristics above or below.</li> </ul>
High	<p>Projects with two or more of the following characteristics:</p> <ul style="list-style-type: none"> <li>• project duration &gt; 6 months</li> <li>• project working within or discharging to sensitive environment such as marine parks, wetlands or waterway</li> <li>• soils with high to very high erodibility rating (i.e. dispersive soils)</li> <li>• projects which have &gt; 1 hectare of land exposed during months with monthly rainfall erosivity (R factor) is greater than 285</li> <li>• topography factor (LS) is greater than 2 or modal slopes on project are steeper than 15% (6.6 degrees).</li> </ul>

While Table 1 above has been prepared as indicative of likely erosion risk level there are many factors that impact on the actual environmental risk. With the breadth of infrastructure projects delivered by the department – including location, duration, season, type and receiving environments – it is difficult to develop a simple table that will account for every scenario.

The department's project managers in consultation with design consultants and environmental officers are encouraged to state the risk level that is appropriate for their project in Clause 2 of Annexure MRTS52.

Factors that should be taken into account when determining the project risk level include soil type, location and timing (rainfall volume, intensity and likelihood), landform (including the ability to install sediment basins or other erosion and sediment controls).

#### 1.4 Erosion and sediment control principles

The primary purpose in installing sediment and erosion controls is to not cause environmental harm nor deposit prescribed water contaminants in waterways as per the *Environmental Protection Act*.

In addition appropriate erosion control can have the benefit of decreasing soil degradation hence improving asset protection and decreasing maintenance costs during and post construction.

Erosion and sediment control for all projects shall be designed, installed, maintained and decommissioned in accordance with the following principles:

- a) erosion and sediment controls are integrated with construction planning
- b) effective and flexible erosion and sediment control plans are developed based on soil, weather, construction conditions and the receiving environment
- c) the extent and duration of soil exposure is minimised
- d) water movement through the site is controlled - in particular clean water is diverted around the site
- e) soil erosion is minimised
- f) disturbed areas are promptly stabilised
- g) sediment retention on site is maximised
- h) controls are maintained in proper working order at all times, and
- i) the site is monitored and erosion and sediment control practices adjusted to maintain the required performance standard.

## 2 Definition of terms

The terms in this technical specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*.

Additional terms used in this specification shall be as defined in Table 2.

**Table 2 – Definition of terms**

Term	Definition
AEP	Annual Exceedance Probability The probability that a given rainfall total accumulated over a given duration will be exceeded in any one year.



Term	Definition
Appropriately qualified person (AQP)	<p>Appropriately qualified person(s) is as defined by the administering authority of the <i>Environmental Protection Act</i>.</p> <p>The definition at time of publication of this specification relevant to temporary sediment and erosion control is:</p> <p>.. a person or persons who has professional qualifications, training, skills or experience relevant to the nominated subject matter and can give authoritative assessment, advice and analysis to performance relative to the subject matter using the relevant protocols, standards, methods or literature.</p> <p>The appropriately qualified person(s) should have, or collectively have, all the following capabilities:</p> <ol style="list-style-type: none"> <li>a) A detailed understanding of relevant sections of the following guidelines and legislation:                             <ol style="list-style-type: none"> <li>i. <i>Environmental Protection Act</i> and <i>Environmental Protection Regulation</i></li> <li>ii. <i>Environmental Protection (Water) Policy</i></li> <li>iii. <i>Environment and Heritage Protection Urban Stormwater Planning Guidelines</i></li> <li>iv. <i>Queensland Urban Drainage Manual</i></li> <li>v. <i>IECA Best Practice Erosion and Sediment Control Manual</i>.</li> </ol> </li> <li>b) An understanding of hydrology and hydraulics, including the ability to size and determine stabilisation requirements of drainage structures and treatment devices.</li> <li>c) An understanding of soil as it relates to revegetation and erosion. Specifically the ability to conduct an effective soil sampling program, interpret results and design management strategies to address problem soils (pH, sodic, dispersive, and saline).</li> <li>d) An understanding of appropriate use of the revised universal soil loss equation (RUSLE) to estimate soil loss.</li> <li>e) An understanding of the erosion, drainage and sediment controls considered best practice in Australia, and knowledge on the correct installation, operation and maintenance of these controls.</li> <li>f) Ability to prepare erosion and sediment control plans of a standard that is suitable for construction.</li> <li>g) Has experience in erosion and sediment control and a suitable environmental or engineering degree from a recognised institution.</li> </ol>
CPESC	Certified Professional in Erosion and Sediment Control. A CPESC is an example of a person likely to be appropriately qualified.
DEHP	Department of Environment and Heritage Protection (Queensland)
EMP(C)	Environmental Management Plan (Construction)
Environmental harm	As defined by the <i>EP Act</i> , including nuisance, serious and material environmental harm.
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
EY	Exceedances per year
IFD	Intensity Frequency Duration

Term	Definition
Rainfall erosivity	<p>The ability of rainfall to cause erosion.</p> <p>Rainfall erosivity can be determined using the formula Annual Average erosivity <math>R = 164.74 (1.1177)^S \times S 0.64444</math> where S = 2 year ARI, 6 hour rainfall event (mm/h). The average monthly erosivity is the annual average erosivity x % rainfall that falls in that month.</p> <p>Alternatively rainfall erosivity risk ratings for various towns are provided in Table 4.4.4 of <i>IECA Manual</i>.</p>
RUSLE	<p>Revised Universal Soil Loss Equation (RUSLE)</p> <p>Predictor of erosion risk based on the estimated annual soil loss.</p> $A = R \times K \times LS \times C \times P$ <p>A = annual soil loss due to erosion (t/ha/year)                      R = rainfall erosivity factor                      K = soil erodibility factor                      LS = topographic factor based on slope length and gradient                      C = cover and management factor                      P = erosion control practice factor</p> <p>Refer to <i>IECA Manual</i>, Appendix E for further information.</p>
RPEQ	Registered Professional Engineer, Queensland
Type 1, Type 2 and Type 3 controls	As defined by <i>IECA Manual</i> 'Sediment Control Classification System' design guide.

### 3 Referenced documents

Table 3 lists documents referenced in this technical specification.

Unless otherwise specified a reference to a statute includes its delegated legislation and a reference to a statute or delegated legislation or a provision of either includes consolidations, amendments, re-enactments and replacements.

**Table 3 - Referenced documents**

Reference	Title
ARR	Australian Rainfall and Runoff, Engineers Australia
DEHP Standard Work Method	Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland (Department of Environment and Heritage).
EP Act	Environmental Protection Act including subordinate legislation and regulations
Monitoring and Sampling Manual	Monitoring and Sampling Manual 2009, Version 2, July 2013 (Department of Environment and Heritage Protection)
IECA Manual	International Erosion Control Association Australasia "Best Practice Sediment and Erosion Control"

Reference	Title
South East Queensland (SEQ)	As defined by Sustainable Planning Regulation or subsequent legislation. Includes areas of: Brisbane City Council Gold Coast City Council Ipswich City Council Lockyer Valley Regional Council Logan City Council Moreton Bay Regional Council Toowoomba Regional Council (part of) Redland City Council Scenic Rim Regional Council Somerset Regional Council Sunshine Coast Regional Council Noosa Shire Council
Geotechnical Design Standard	Transport and Main Roads Geotechnical Design Standard
MRTS03	Transport and Main Roads Specification MRTS03 Drainage, Retaining Structures and Protective Treatments
MRTS04	Transport and Main Roads Specification MRTS04 General Earthworks
MRTS16	Transport and Main Roads Specification MRTS16 Landscape and Revegetation Works
MRTS27	Transport and Main Roads Specification MRTS27 Geotextiles (Separation and Filtration)
MRTS50	Transport and Main Roads Specification MRTS50 Specific Quality System Requirements
MRTS51	Transport and Main Roads Specification MRTS51 Environmental Management
Water and Wastewater Sampling Guidelines	EPA Guidelines, Regulatory Monitoring and Testing, Water and Wastewater Sampling (South Australian Environment Protection Agency, 2007).

#### 4 Standard test methods

Unless stated elsewhere herein, testing shall be carried out in accordance with the relevant Australian Standard. All laboratory analyses required under this technical specification must be carried out by a laboratory that has National Association of Testing Authorities (NATA) certification, or an equivalent certification, for such analyses.

#### 5 Quality system requirements

##### 5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points and Milestones applicable to this specification are summarised in Table 4.

**Table 4 - Hold Points and Milestones**

Clause	Hold Point
6.1	1. Assessment of suitability of Erosion and Sediment Control Plan for each stage and/or section of the works where required.
7.1	2. Installation of appropriate erosion and sediment controls in each section of the works.

The number of hold points relating to Erosion and Sediment Control will be dependent on the risk associated with the project.

- For low risk projects there are likely to be two hold points on the project – the first being no works to occur prior to the assessment of suitability of the ESCP, the second being no earthworks (other than works necessary to install devices) until erosion and sediment control devices have been installed.
- For high risk projects there is likely to be many hold points throughout the project as the assessment of suitability of the plan and assessment of installation of controls shall be required for each section or stage of the works.

## 6 Erosion and Sediment Control Plan

### 6.1 General

Before the natural surface is disturbed on a section of the Works, the Contractor shall submit an Erosion and Sediment Control Plan (ESCP) for that section.

An ESCP is required to be prepared for all areas prior to use or disturbance including auxiliary areas under the control of the contractor such as stockpile and storage areas, access and haulage tracks, temporary waterway crossing, borrow areas, compound areas and material processing areas.

Clearing and grubbing (or the use of the area for stockpiles) for that section shall not start until the ESCP for that section is assessed as suitable by the Administrator. **Hold Point 1**

For high risk projects multiple erosion and sediment control plans will be required for sections that have significant cut and fill (e.g., a plan for clearing, a plan for commencement of bulk earthworks and a plan for completion of earthworks). Prior to significant changes to drainage flow or sediment treatment locations, an updated erosion and sediment control plan shall be developed and submitted by the Contractor and assessed as suitable by the Administrator. Each ESCP shall clearly detail the area and work that it is valid for. It is acceptable to have a primary 'over-arching' ESCP supplemented by numerous progressive ESCP on a project.

Timelines for assessment of suitability of ESCP shall be as per Conditions of Contract for the assessment of EMP(C).

### 6.2 Plan requirements

The Erosion and Sediment Control Plan (ESCP) shall be developed in accordance with the principles in Clause 1.4 of this specification and taking into account:

- a) seasonal conditions

- b) soil types, particularly dispersive, sodic, saline soils and acid sulfate soils
- c) topography, particularly areas with natural, during construction or final slope > 10%
- d) local hydrology and drainage affecting the worksite including temporary and overland flow paths
- e) specific project issues including no go zones, protected flora and fauna, private property boundaries, contaminated land, and
- f) specific project issues and requirements listed in MRTS52 Annexure Clause 3.

The ESCP shall consist of the following:

- a) the works and area that the plan is valid for
- b) the location of major features of the site, such as waterways, limitations of disturbance areas, property boundaries and other special features (including sensitive environments, contaminated land, dispersive soils)
- c) contour lines or flow direction arrows sufficient to show direction of waterflow
- d) the type and location of all erosion and sediment control measures, including but not limited to:
  - i. proposed erosion control measures including soil treatment and batter stabilisation methods such as soil binders, geofabric, hydromulching and/or early revegetation
  - ii. drainage paths for runoff from exposed area and diversion drains for clean water
  - iii. sediment controls such as sediment basins for all areas greater than one hectare on general and high risk sites, and Type 2 and Type 3 controls for other areas
  - iv. location of nominated discharge points, and
  - v. site exit points and controls.
- e) the installation sequence and timing of controls including timing of installation of any permanent works being relied upon as drainage control during construction
- f) list of any deviations from *IECA Manual* with regard to the installation, construction and maintenance of all erosion and sediment control measures (in particular any deviation from Book 4 – Design Fact Sheets and Book 6- Standard Drawings) and justification for such deviations
- g) the response strategy for managing significant rain events, and
- h) the person/s responsible for development of the ESCP including their experience and qualifications for determination by the Administrator as to whether appropriately qualified.

For general risk sites the ESC Plan shall include the above (a to h) and:

- i) design calculations for all drainage and sediment control measures, including sediment basins, earth banks high flow/spillways, outlet structures and drainage lines.

The administrator may also request to view the calculations for low risk sites.



For high risk sites the ESC Plan shall include the above (a to i) and:

- j) the qualifications and experience of the independent verifier (refer to Clause 6.3 below) and a statement from the independent verifier that the ESCP if implemented correctly will meet the requirements of this specification, and
- k) the proposed frequency and timing of independent audits (refer to Clause 9.1.2)
- l) the monitoring and maintenance requirements for the project site, erosion and sediment controls and receiving environment.

The ESCP for all projects undertaken in South-East Queensland shall comply with *Procedural Guide - Standard work method for the assessment of the lawfulness of releases to waters from construction sites in South East Queensland (Department of Environment and Heritage)*.

The number and complexity of the Erosion and Sediment Control Plans will vary depending on the size and complexity of the project.

For low risk projects, the above specification could be met by one drawing or diagram that includes notes on timing of installation of controls.

For high risk and large scale general projects the ESCP is likely to consist of multiple sets of drawings for various areas, and various stages of each area. One option for major projects is for an overarching ESCP to be developed containing key methods, procedures and features which is then supplemented by numerous progressive ESCP. A report detailing assumptions and calculations for drainage, erosion and sediment controls will also be required.

Note that the response strategy for managing significant rain events may be contained within the Severe Weather Management Plan or other document.

### 6.3 Personnel – plan development

The Erosion and Sediment Control Plan shall be prepared and updated by personnel who have the requisite level of training and experience outlined in Table 5, or as modified by Annexure MRTS52 Clause 5.

**Table 5 - Erosion and Sediment Control Plan – personnel minimum requirements**

Erosion Risk Level (as per Clause 1.3)	Minimum requirements for plan development and verification
Low	<ul style="list-style-type: none"> <li>• ESCP to be prepared by a person who has undertaken environmental representative training and has at least five years' experience in relevant construction type (for example, roadwork construction).</li> </ul>
General	<ul style="list-style-type: none"> <li>• ESCP to be prepared by Appropriately Qualified Person/s (see definitions) with experience in relevant construction type (for example general road projects).                             <ul style="list-style-type: none"> <li>• Drawings and design for any items that are Prescribed Engineering Service (PES) as per the <i>Professional Engineers Act, 2002</i> shall be certified by an RPEQ.</li> </ul> </li> </ul>

Erosion Risk Level (as per Clause 1.3)	Minimum requirements for plan development and verification
High	<ul style="list-style-type: none"> <li>• ESCP to be prepared by Appropriately Qualified Person/s (see definitions) with experience in relevant construction type (for example major road projects).</li> <li>• Drawings and design for any items that are Prescribed Engineering Service (PES) shall be certified by an RPEQ.</li> <li>• ESCP to be reviewed and deemed suitable by an independent verifier who is an Appropriately Qualified Person.</li> </ul>

The Contractor must submit details of the person preparing the ESCP and the verifier to the Administrator with the ESCP for determination of suitability by Administrator. The Contract may submit details prior to engagement of said person/s.

#### **6.4 Implementation and revision of plan**

The Contractor shall:

- a) implement the Erosion and Sediment Control Plan
- b) monitor the continued effectiveness of the ESC during the contract
- c) update the ESCP where necessary.

The plans shall be updated in accordance with Clause 5.1 of this specification, and updated such that all major drainage paths and Type 1 sediment treatment devices are shown correctly. The updates shall be undertaken by personnel approved as suitable by the Administrator (that is, who has the requisite level of training and experience outlined in Table 5, or as modified by Clause 4 of Annexure MRTS52).

### **7 Erosion and sediment control management – general requirements**

#### **7.1 Installation**

As soon as practicable and prior to initial earthworks operations (clearing and grubbing) for any stage or section of the works, the Contractor must install erosion and sediment controls (including sediment traps, catch banks and diversion drains) associated with drainage paths flowing through the works area. The completion of these activities will be a Hold Point for any further earthworks. **Hold Point 2**

Where clearing is required in order to construct or install the erosion and sediment controls this shall be discussed and approved by the Administrator.

#### **7.2 Operation and maintenance**

The Contractor shall maintain all erosion and sediment controls in effective working order including reconfiguring drainage lines as required during the construction process to ensure runoff from exposed areas is directed into sediment controls at all times.

Reuse of the water collected in sediment ponds or basins for dust suppression and roadworks is preferred over release into the environment. Where water is being stored for dust suppression the required design capacity of the basins shall be available.

Sediment basins and other sediment controls shall be operated and maintained in a manner that minimises the risk of environmental harm. The design capacity of the upper settling volume shall be made available within 120 hours of the most recent rainfall event which causes runoff.

The sediment storage zone shall be maintained at all times with the accumulated sediment removed in a manner that does not allow the sediment to be conveyed into a watercourse or offsite.

Where coagulants or flocculants are used to treat stormwater:

- a) A jar test or streaming current detector (SCV) must be undertaken to determine the volumes of the coagulant or flocculant required and to reduce the risk of overdosing. The type and volume of coagulant or flocculant used must be in accordance with the test results and recorded on discharge water quality spreadsheet (refer to Section 8.2.2 below).
- b) The coagulant or flocculant must not causing harm to the receiving waters or environment, and
- c) The sediment captured within the basin containing flocculant or coagulant must be disposed of in accordance with the safety data sheet of the product used.

Coagulants or flocculants containing aluminium (including alum and PAC) shall not be used when water is being discharged to an acidic environment where natural pH is less than 6.0 (such as wallum stream or wetland).

The greatest environmental risk from coagulants/flocculants exists when overdosing has occurred. This risk can be mitigated by discharging water from sediment basin that has been flocced into a drainage channel rather than directly into a waterway. For projects using coagulants other than gypsum this practice is recommended.

### **7.3 Decommissioning and removal**

The Contractor shall remove temporary controls when permanent measures are in place and/or site stabilisation has occurred. This should occur prior to the end of the Defects Liability Period or the end of the Landscape and Revegetation Works Monitoring Period whichever is the later. The Contractor will not receive a Final Certificate until these temporary controls have been removed from the site.

Any areas used for erosion and sediment control shall be rehabilitated to the satisfaction of the Administrator.

## **8 Erosion and sediment control management – performance requirements**

### **8.1 Performance requirements**

There shall be no erosion resulting from construction practices unless there are provisions within the worksite to manage resultant sediment.

#### **8.1.1 Reuse**

The reuse of the stormwater including water captured in sediment basins such as for dust suppression, roadworks or landscaping is preferred over release into the environment. Where water is to be reused for landscaping refer to MRTS16 for quality requirements.

Approval from the Administrator is required where captured water is to be reused on roadworks.

### 8.1.2 Discharge

Runoff from site including releases from sediment basins shall comply with the following unless varied by MRTS52 Annexure Clause 3.1:

**Table 6 - Discharge criteria**

Parameter	Discharge Criteria
Suspended Solids	For high risk projects: <ul style="list-style-type: none"> <li>Not to exceed 50 mg/L for rainfall events up to and including the 85th percentile 5 day rain event.</li> </ul>
Turbidity	For low and general risk projects: <ul style="list-style-type: none"> <li>Not to exceed 75NTU (for rainfall events up to and including the 80th percentile 5 day rain event), or</li> <li>As determined by correlation of turbidity with 50 mg/L suspended solids.</li> </ul> For high risk projects: <ul style="list-style-type: none"> <li>the turbidity limit shall be determined by the Contractor by correlating turbidity with the suspended solids limit.</li> </ul>
pH (general)	General: 6.5 – 8.5 Wallum/Acidic Ecosystems: 5.0 – 7.0
Hydrocarbons	No visible trace
Waste	No waste or litter

Water shall not be released until pH is stable.

Releases from site must not cause scour at the area of discharge. Water must only be released at the discharge point nominated within the ESCP and as deemed acceptable by the Administrator. Any modification to discharge point must be agreed by the Administrator.

The Project Manager and/or Environmental Officer is encouraged to develop site specific discharge criteria relevant to the receiving environment/catchment site based on the risks to the receiving environment and site specific information available. In particular it is recommended that site specific criteria be developed for:

- naturally occurring acid environments and ecosystems such as wallum streams, and
- projects located in western catchments such as Murray-Darling and desert channel area.

Consideration may need to be given to the analysis of water for electrical conductivity (EC) particularly if using a coagulant or flocculant which increases EC and water being discharged into a low salinity low flow stream.

### 8.1.3 Offsite impacts - waterways

Construction works shall not result in erosion and sedimentation that causes environmental nuisance or harm outside the worksite, or to permanent water bodies within the worksite.

Unless varied by MRTS52 Annexure Clause 3.2 water quality of a waterway outside the parameters below shall be investigated by the Contractor and reported to the Administrator.

**Table 7 - Water quality investigation criteria (waterways)**

Issue	Investigation Criteria	
	Levels	Change (Upstream – Downstream)
Dissolved Oxygen (mg/L or % saturation)	> 85% saturation for flowing waters DO > 5 mg/L	10% decrease
pH	General: 6.5 – 8.5 Wallum/Acid ecosystems: 5.0 - 7.0	1.0 pH unit change
suspended solids (mg/L) or turbidity (NTU)		10% increase
Electrical conductivity		20% change
Hydrocarbons	No visible trace	
Waste	No waste or litter	

#### 8.1.4 Offsite impacts – roadways

Sediment shall not be tracked onto a road, cycleway or footpath external to the project site where that sediment has the potential to enter the stormwater system during a rain event, or where sediment has the potential to cause a safety hazard to motorists or pedestrians. The Contractor shall install sediment control measures as per *IECA manual* for all construction exit points.

### 8.2 Monitoring and reporting

#### 8.2.1 Monitoring of rainfall

The Contractor shall install a proprietary rain gauge and keep a record of the rainfall depth (mm) of each rainfall event, and where possible duration of the rainfall event. For large projects where rainfall is likely to differ significantly across the site the Contractor shall install a rain gauge at locations representative of each climatic zone.

Where a release of water causes non-compliance with the limits detailed in Section 8.1.2 and 8.1.3 the Contractor shall determine the size of the rainfall event and provide this information to the Administrator. The Contractor shall use the most recently available IFD (Intensity – Frequency-Duration) data available through the Bureau of Meteorology ([www.bom.gov.au](http://www.bom.gov.au)). Alternatively the Contractor may utilise data from a calibrated site based rainfall intensity gauge.

The rainfall event shall be expressed as exceedance probability (for example, 10% Annual Exceedance Probability (AEP) except those events that are more frequent than 50% AEP which shall be expressed as number of exceedances per year (EY). While the use of ARI is discouraged, the Contractor may be requested to also express the rainfall event in this manner until such time as the administering authority requirements are updated in line with Australian Rainfall and Runoff (ARR) recommendations.

#### 8.2.2 Monitoring of discharges

Waters released from sediment basins or trap must be sampled prior to release. The samples taken must be representative of the water being discharged.



The water shall be analysed for:

- a) pH
- b) turbidity and/or suspended solids (as per Table 6 or Annexure MRTS52 Clause 4.1)
- c) any other parameter nominated in Annexure MRTS52 Clause 4.1, and
- d) visually for hydrocarbons and litter.

The results of monitoring shall be recorded in a dedicated spreadsheet and compared against discharge criteria. Water above discharge criteria shall not be released other than in the case of safety reasons or where there is a demonstrable environmental benefit of releasing. The type and volume of flocculant/coagulant used (if used) shall be also recorded on this spreadsheet.

Any release (purposeful or otherwise) outside of discharge criteria shall be immediately reported to the Administrator and treated as a non-conformance. Where the discharge causes or has the potential to cause environmental harm as defined by *Environmental Protection Act* the event shall also be reported to the regulatory authority.

Otherwise, reporting of results shall be as per Clause 9.3.

Where it is not possible to sample water prior to discharge or runoff from site (for example, sheet flow) visual water quality monitoring shall be undertaken. Records of the results of the visual observations shall be kept within daily inspection records.

### **8.2.3 Monitoring of environment (waters)**

The Contractor shall conduct water quality monitoring as per any licence, permit or approval conditions.

Unless otherwise required by licence, permit, and approval condition or varied by Annexure MRTS52 Clause 4.2:

- a) All waterbodies and waterways within the project site, and all waterbodies and waterways where stormwater is discharged shall be monitored.
- b) Monitoring shall be undertaken:
  - i. at least one week prior to construction activities
  - ii. weekly during construction activities that have the potential to impact the waterbody or waterway, and
  - iii. immediately following a discharge from sediment basin and/or a rain event causing runoff into the waterway or waterbody.
- c) Monitoring shall be undertaken at a representative location upstream and downstream of the works. Where possible the downstream monitoring location should be no more than 100 metres downstream of the works.
- d) Water shall be analysed for:
  - i. pH
  - ii. turbidity and/or suspended solids
  - iii. dissolved oxygen

- iv. electrical conductivity, and
- v. visually for hydrocarbons and litter.

Monitoring shall be undertaken in accordance with the *Monitoring and Sampling Manual*, DEHP, 1999. Use of field water quality meters shall be undertaken in accordance with manufacturer's requirements (including calibration) and Section 5.2 of *Water and Wastewater Sampling Guidelines* (SA, EPA, 2007).

The results of monitoring shall be recorded in a dedicated spreadsheet and compared against investigation criteria and previous monitoring results. The monitoring results, including results of investigations, shall be provided to the Administrator monthly.

For each result that exceeds the investigation criteria the Contractor shall:

- a) report the exceedance to the Administrator within 24 hours (unless significant issue or release occurred in which case reporting requirements shall follow incident procedures)
- b) investigate the cause of the exceedance
- c) develop and implement improved work procedures or mitigation measures to improve water quality
- d) report the results of the investigation and the actions taken on (or attached to) the water quality monitoring spreadsheet, and
- e) provide the above information to the Administrator within the next monthly report.

Any exceedances deemed to be caused by the project works shall be treated as a non-conformance.

Where the exceedance is considered to have caused or have the potential to cause environmental harm as defined by *Environmental Protection Act* the event shall be reported as per incident reporting requirements to the relevant regulatory authority.

## **9 Administrative requirements**

### **9.1 Inspections and audits**

#### **9.1.1 Contractor inspections and audits**

The Contractor shall undertake inspections and audits at the frequency identified by MRTS51. The site inspections shall include visual assessment of erosion and sediment control structures to verify their condition and effectiveness, and of all site discharge points.

#### **9.1.2 Independent audits**

For sites determined to have a high erosion risk (by Table 1 of this Annexure or as nominated in MRTS52 Annexure Clause 2) the Contractor shall engage an independent Appropriately Qualified Person (AQP). The AQP shall assess the compliance of ESC measures against this specification and the accepted ESCP and the compliance of the ESC measures with the ESCP objectives and discharge limits.

The Contractor shall submit the independent review report to the Administrator with proposed and completed actions undertaken to address the identified issues not more than seven days following the audit.

Unless modified by Clause 5.1 of Annexure MRTS52 the Contractor shall allow for a minimum of three independent audits for each stage of the project – for example: one audit immediately following clearing and grubbing and one audit during cut and fill and one audit at end of major earthworks.

The Administrator may request the Contractor to have an independent audit at any time throughout the project.

Transport and Main Roads may elect to nominate a greater frequency such as monthly if desired or nominate high frequency for areas around sensitive environments.

### **9.1.3 Administrator and principal audits**

The Administrator or the Principal may undertake compliance audits of the Contractor's sediment and erosion control measures and provide feedback.

Feedback will be provided in the form of audit report and in line with Principal's Contractor Performance Report in the *Transport Infrastructure Project Delivery System* (available at [www.tmr.qld.gov.au](http://www.tmr.qld.gov.au)).

Any non-conformances identified as a result of these audits shall be managed as per the non-conformance and corrective action requirements outlined in Clause 10.2 of MRTS50.

### **9.2 Non-conformances and incidents**

Management and reporting of non-conformances and incidents relating to erosion and sediment control shall be as per requirements for environmental non-conformances and incidents (Clause 7.4 of MRTS51). Notification to the Administrator or the Principal does not in any way negate the requirements on the Contractor to notify DEHP, other regulatory authorities and landowners under the *Environmental Protection Act* or other Acts.

The Administrator reserves the right to seek costs against the Contractor for incidents that cause environmental harm. The costs shall correspond to the cost for additional administration of the contract (which may include investigation of the incident, internal and external reporting of incident, meetings and correspondence). The costs shall be recovered based on the hourly rate listed in Clause 6 of Annexure MRTS52.

### **9.3 Records and reporting**

The Contractor shall establish records to show the Contractor's conformance to the requirements of this Specification and other relevant reference documents. All records and registers maintained by the Contractor shall be available for inspection by the Administrator upon request.

For general and high risk sites, compliance with and issues relating to Erosion and Sediment Control shall be reported with the Contractor monthly environmental report (Clause 7.3 of MRTS51).

The monthly report shall contain:

- a) results of discharge monitoring (as per 8.2.1 above)
- b) results of waterway monitoring (as per 8.2.2 above), and
- c) key activities to be undertaken within the next month, the controls in place and the actions that will be taken to mitigate the potential environmental risks associated with those activities.

## 10 Design and technical standards

### 10.1 Technical standards

The Contractor shall ensure sediment and erosion controls are designed, installed and maintained in accordance with the *IECA Manual* (particularly Book 4 – Design Fact Sheets and Book 6 – Standard Drawings) and manufacturers specifications except as modified by design requirements in Clause 10.2 below.

Where controls will become permanent, the relevant specification shall have precedence, for example:

- a) MRTS03 shall apply for drainage controls that become permanent including sheet or strip filter drains
- b) MRTS16 shall apply for permanent revegetation (including specifications for cover crop to be included within permanent seed mixes), and
- c) MRTS27 shall apply for geotextiles that are part of the permanent works.

### 10.2 Design requirements

Controls shall be designed to have the capacity and structural strength specified in Table 8.

**Table 8 - Design requirements**

Item	Disturbed area open for:		
	0 - 12months	12 – 24 months	> 24 months
Drainage controls: <ul style="list-style-type: none"> <li>• diversion drains</li> <li>• channels</li> <li>• batter chutes.</li> </ul>	40% AEP or (~ 2 year ARI)	20% AEP (~ 5 year ARI)	~ 10% AEP (10 year ARI)
Sediment basins	80th percentile 5 day rain event Projects adjacent to sensitive receiving waters: 85th percentile, 5 day rain event.		
Sediment basin inlet	20% AEP (~ 5 year ARI)	~ 10% AEP (10 year ARI)	~ 10% AEP (~ 10 year ARI)
Sediment basin – emergency outlet, embankments.	5% AEP (~ 20 year ARI)	5% AEP (~ 20 year ARI)	2% AEP (~ 50 year ARI)

#### 10.2.1 Sediment basin embankments

Fill materials used for the construction of sediment basin embankment shall be in accordance with “Water Retaining Embankments” in Clause 14.2.6 of MRTS04 *General Earthworks*. The material shall be compacted to not less than 97% in accordance with “Levee Embankment” requirement stipulated in Table 15.3-B of MRTS04. The stability requirements shall be as per Clause 2 of the department’s *Geotechnical Design Standard*.

#### 10.2.2 Catch drains

Triangular V drains (Type B catch drains as shown in IECA Standard Drawing CD-01: Catch Drains) shall not be installed in areas with dispersive soil.

## **11 Supplementary requirements**

The requirements of MRTS52 *Erosion and Sediment Control* are varied by the additional requirements specified in Annexure MRTS52 Clause 7.