LOWER FITZROY RIVER
INFRASTRUCTURE PROJECT

Appendix M

Fitzroy River turtle (*Rheodytes leukops*) species management program

SunWater
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Gladstone Area Water Board

Gladstone Area Water Board and SunWater

Lower Fitzroy River Infrastructure Project

Fitzroy River turtle (*Rheodytes leukops*) species management program

June 2015

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Acronyms

Acronym	Definition
AHD	Australian height datum
AMTD	Adopted middle thread distance
ANZECC	Australian and New Zealand Environment and Conservation Council
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
CFD	Computational fluid dynamics
DEHP	Department of Environment and Heritage Protection
DERM	Department of Environment and Resource Management
EIS	Environmental impact statement
EMP	Environmental management plan
EO Act	*Environmental Offsets Act 2014* (Queensland)
EP Act	*Environmental Protection Act 1994* (Queensland)
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
FSL	Full supply level (elevation in m AHD)
GED	General environmental duty
IECA	International Erosion Control Association
km	Kilometre/s
LFRIP	Lower Fitzroy River Infrastructure Project
m	Metre/s
Ml/a	Mega litre per annum
N	Number of records
NC Act	*Nature Conservation Act 1992* (Queensland)
NES	National environmental significance
NRM	Natural Resource Management
PIT	Passive integrated transponder
RCC	Roller compacted concrete
ROP	Fitzroy Basin Resource Operations Plan 2004
SMP	Species Management Plan
Water Act	*Water Act 2000*
WRP	*Water Resource (Fitzroy Basin) Plan 2011*

1. Introduction

1.1 Overview

The Fitzroy River turtle (*Rheodytes leukops*) is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the Queensland *Nature Conservation Act 1992* (NC Act). The Fitzroy River turtle is endemic to the Fitzroy Basin catchment and the species is known to occur within the footprints of the Lower Fitzroy River Infrastructure Project (Project). The Project, proposed by Gladstone Area Water Board and SunWater Limited, includes construction and operational activities to raise the existing Eden Bann Weir and/or to establish a new weir at Rookwood on the Fitzroy River, Central Queensland.

The aquatic ecological assessment conducted for the Project's environmental impact statement (EIS) (Volume 1, Chapter 7 Aquatic fauna and Appendix L), identifies and discusses potential impacts of the Project on the Fitzroy River turtle and its habitat within, upstream and downstream of the Project footprints.

The assessment of the potential impacts on the Fitzroy River turtle (Chapter 7 Aquatic fauna and Appendix L) against the *Matters of National Environmental Significance Significant impact guidelines 1.1* (DoE 2013) has identified that the Project is likely to have a residual impact on this species and offsets are required in accordance with the EPBC Act and the Queensland State *Environmental Offsets Act 2014* (EO Act). Offset requirements are discussed further in Volume 1, Chapter 22 Offsets and Volume 2, Chapter 14 Offsets.

This Species Management Program (SMP) has been developed to provide a framework for the management of the Fitzroy River turtle. The SMP presents information on the biology of the Fitzroy River turtle, and identifies existing threatening processes. Potential Project impacts (as described in the draft EIS) are presented and management plans in relation to the Fitzroy River turtle for Project planning and design, construction and commissioning, and operation are provided. The key objectives of the management plans are outlined in an operational policy framework and aligned with performance criteria and monitoring requirements. The implementation strategy of each management plan has been specifically developed to minimise Project impacts that have the potential to contribute to existing threatening processes impacting the Fitzroy River turtle.

The key threatening process is nest predation leading to a low level of recruitment into the population (Limpus et al. 2007; Department of Environment and Resource Management (DERM) 2008; Limpus et al. 2011a). Nest predation rates are extremely high at close to 100 per cent. The management actions proposed in this SMP are designed to support the recovery of the Fitzroy River turtle and avoid any additional impacts as a result of the Project.

1.2 Project description

The Project includes construction and operational activities to raise the existing Eden Bann Weir and/or establish a new weir at Rookwood on the Fitzroy River, Central Queensland. This work will result in the capture and storage of unallocated but available high priority water reserves (Volume 1, Chapter 9 Surface water resources). A detailed description of the Project is provided in Volume 1, Chapter 2 of the Project EIS. Figure 1-1 shows the Project locality.

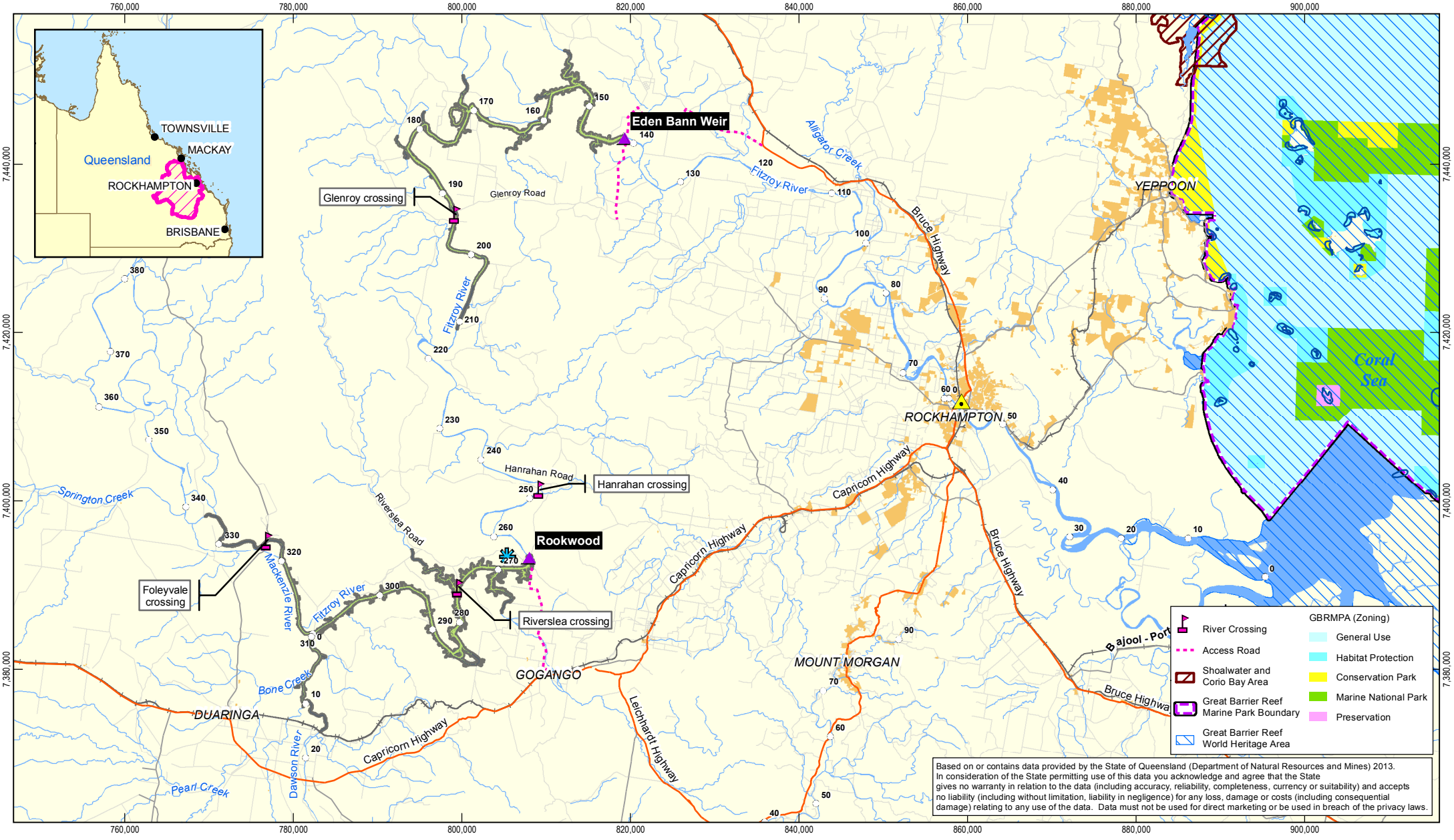
Key Project components include a combination of:

- Eden Bann Weir
  - Eden Bann Weir Stage 2 – a raise of the existing Eden Bann Weir, at 141.2 kilometres (km) adopted middle thread distance (AMTD), from a full supply level of 14.5 metres (m) Australian Height Datum (AHD) to FSL 18.2 m (from 14.5 m AHD) and associated impoundment of the Fitzroy River to approximately 205 km AMTD. Total inundation length of 64 km
  - Eden Bann Weir Stage 3 – the addition of 2 m high flap gates to achieve FSL 20.2 m AHD and associated impoundment of the Fitzroy River to approximately 211 km AMTD. Total inundation length of 70 km.
- Rookwood Weir
  - Rookwood Weir Stage 1 – a new build at 265.3 km AMTD to FSL 45.5 m AHD (15.5 m above the river bed level), saddle dams and associated impoundment of the Fitzroy, Mackenzie (322 km AMTD) and Dawson Rivers. Total inundation length of 61 km
  - Rookwood Weir Stage 2 – the addition of 3.5 m high flap gates to achieve FSL 49.0 m AHD and associated impoundment of the Fitzroy, Mackenzie (335 km AMTD) and Dawson Rivers (16 km AMTD). Total inundation length of 86 km.
- Fish locks and a turtle bypass at each weir.

Other components associated with the Project include:

- Augmentation to and construction of access roads (public and private) to and from the weir sites for construction, operation and upgrades to intersections
- Construction of low level bridges in areas upstream of weir infrastructure impacted by the impoundments, specifically at Glenroy, Riverslea and Foleyvale crossings
- Installation of culverts at Hanrahan Crossing downstream of Rookwood Weir to facilitate access during operation releases
- Removal and decommissioning of existing low level causeways and culverts at river crossings described above
- Resource extraction of construction materials (gravel and sand) from within the river bed and banks (subject to separate environmental assessment and approval).

Operationally the Project comprises the maintenance and management of the weir infrastructure, private access roads and impoundments, inclusive of a flood buffer. Water releases will be made through 'run of river' methods and no water distribution infrastructure (pipeline or channels) is required. Water releases will be made to satisfy environmental and water security objectives in accordance with the Water Resource (Fitzroy Basin) Plan 2011 (Fitzroy WRP). Operating regimes will be developed and implemented through the Fitzroy Basin Resource Operations Plan 2004 (as augmented) (Fitzroy ROP).



1:600,000 (at A4)

0 5 10 15 20

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- AMTD (km)
- Weir Location
- Fitzroy Barrage
- Saddle dams
- Highway
- Major Road
- Streets (Local)
- Access Road
- Fitzroy Basin
- Urbanised Area
- Rookwood Weir Stage 1 impoundment
- Rookwood Weir Stage 2 impoundment
- Eden Bann Weir Stage 2 impoundment
- Eden Bann Weir Stage 3 impoundment

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Project location

Figure 1-1

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Level 9, 145 Ann Street Brisbane QLD 4000 Australia T +61 7 3316 3000 F +61 7 3316 3333 E bnemail@ghd.com W www.ghd.com

Data Source: © Copyright Commonwealth of Australia (Geoscience Australia): Places, Waterways (2007); Sunwater: Waterways, Weir Locations - 2008; DNRM: Railways, Roads, RAMSAR Wetlands, World Heritage Area - 2010; © Copyright Commonwealth of Australia (GBRMPA) Zoning, Boundary - 2011. Created by: MS *See Appendix for disclaimers and copyrights.

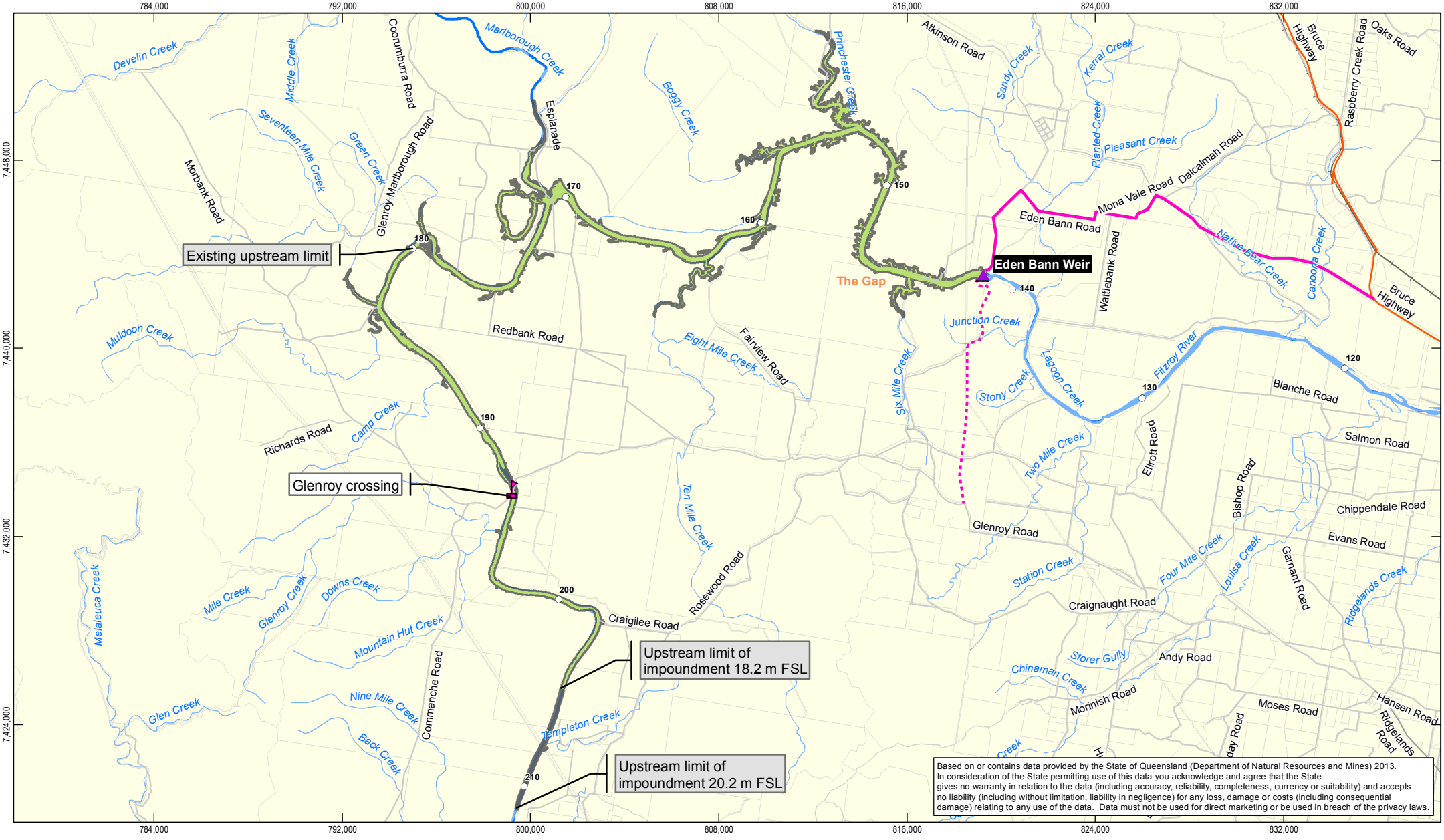
Project construction is expected to be staged, with sequencing and timing dependant on supply/demand balance and drought conditions. Construction is scheduled over a two-year period, allowing for the majority of construction activities to be undertaken over two dry seasons. Impoundment is expected to occur within a single wet season given average river flow conditions during which commissioning will take place.

The milestones and timeframes for the Project are as follows, noting that an actual start date will be determined by a demand trigger coinciding with seasonal factors (Volume 1 Chapter 1 Introduction and Volume 1 Chapter 2 Project description):

- Preparatory and early works (15 to 18 months prior to Q1 Year 1). The early works phase includes:
  - Further investigations such as ecological surveys and studies, geotechnical investigations and hydraulic studies to inform the delivery of the detailed design phase
  - Detailed design (including final design of turtle passage infrastructure)
  - Procurement
  - Development approval applications
  - Land acquisition
  - Cultural heritage surveys
- Contract award (Q1 Year 1)
- Commencement of construction (start-Q1 Year 1)
- Spillway concrete complete (start-Q4 Year 2)
- Commencement of impounding (mid-Q4 Year 2)
- Weir construction practically complete (end-Q4 Year 2)
- Impoundment is expected to occur within a single wet season during which commissioning will take place (Chapter 9 Surface water resources).

For the purpose of the Fitzroy River turtle SMP the following locality descriptions apply:

- Study area - the Fitzroy River, lower reaches of the Mackenzie River and lower reaches of the Dawson River (Figure 1-1)
- Eden Bann Weir Project footprint – the Eden Bann Weir construction area, weir infrastructure areas (including weir wall, abutments, spillway, fish and turtle passage infrastructure, control room, amenities) and impoundment including aquatic and terrestrial (riparian) habitats potentially impacted by the Project. Figure 1-2 shows the location of Eden Bann Weir infrastructure and impoundment extents at full supply levels. The Eden Bann Weir construction area is shown on Figure 1-3
- Rookwood Weir Project footprint - the Rookwood Weir construction area, weir infrastructure areas (including weir wall, abutments, spillway, fish and turtle passage infrastructure, control room, amenities, saddle dams) and impoundment including aquatic and terrestrial (riparian) habitats potentially impacted by the Project. Figure 1-4 shows the location of Rookwood Weir infrastructure and impoundment extents at full supply levels. The Rookwood Weir construction area is shown on (Figure 1-5)
- River crossings – low level bridges and causeways that require upgrades to accommodate raised water levels (Figure 1-2 and Figure 1-4)
- Likely construction resource material extraction areas are shown on Figure 1-6 and Figure 1-7 for Eden Bann Weir and Rookwood, respectively.



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0 2 4 6 8

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- AMTD (km)
- Weir Location
- Highway
- Major Road
- Streets (Local)
- Waterway
- Fitzroy Basin
- Property Boundary
- Eden Bann Weir Stage 2 impoundment
- Eden Bann Weir Stage 3 impoundment
- River Crossing
- Proposed Access Road
- Existing Access Road

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Eden Bann Weir Project footprint

Figure 1-2

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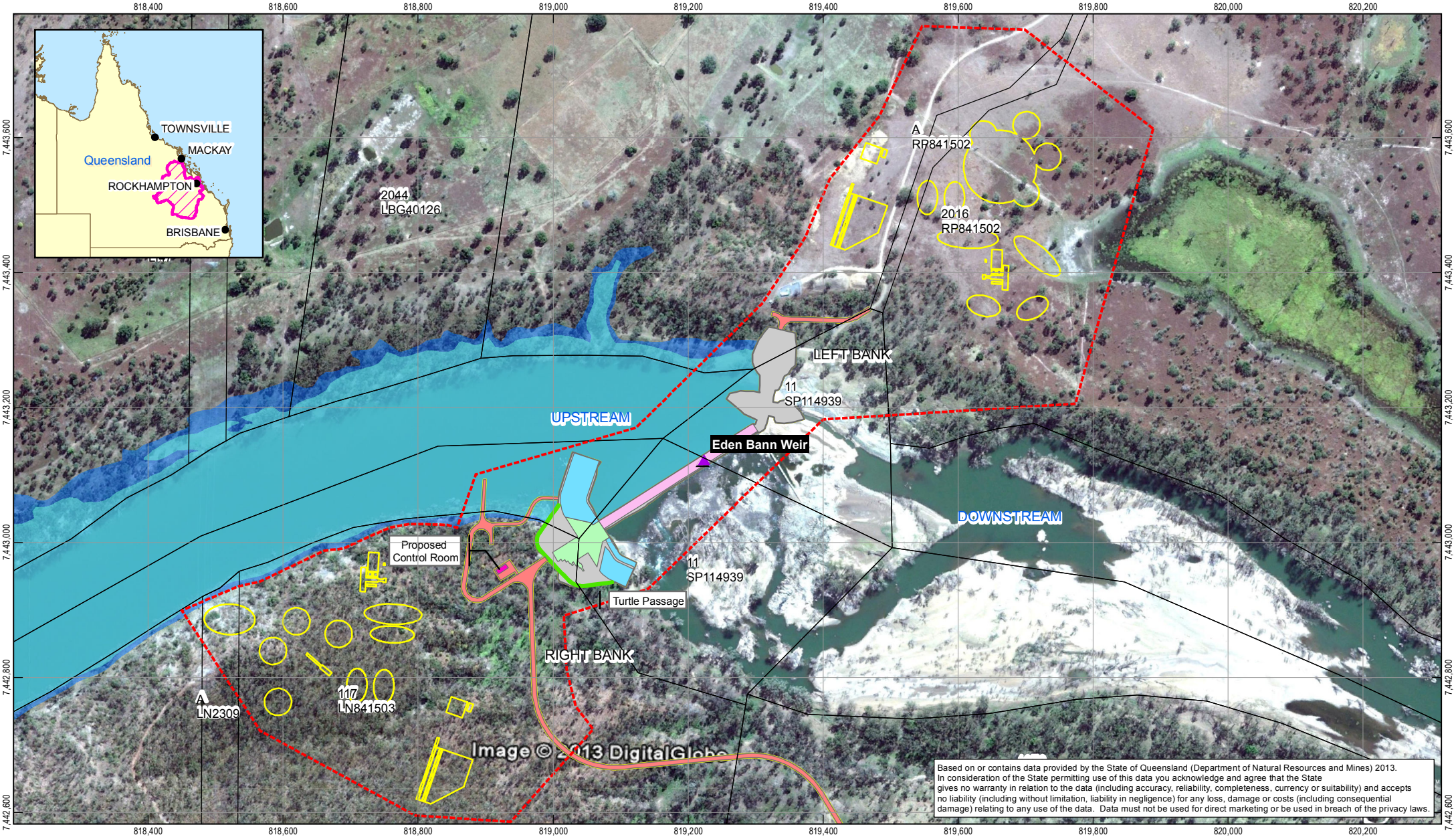

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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- Fitzroy Basin
- Access Roads
- Channel
- Outlet works and fishway
- Proposed Control Room
- Proposed Spillway
- Turtle Passage
- Eden Bann Weir Proposed Structure
- Construction Footprints
- Construction Area
- Eden Bann Weir Stage 2 impoundment
- Eden Bann Weir Stage 3 impoundment

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Eden Bann Weir construction area

Figure 1-3

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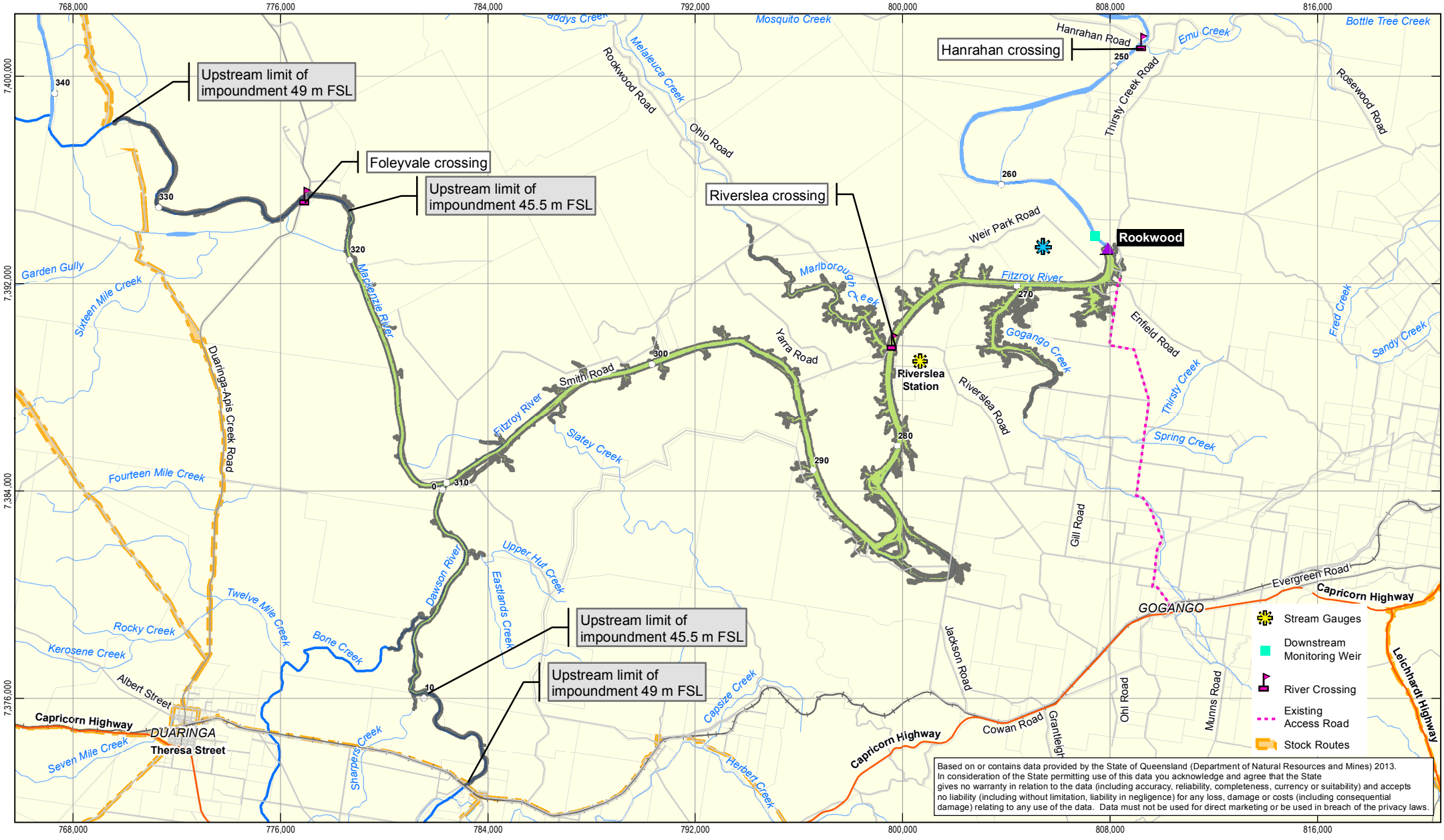

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0 2 4 6 8

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- AMTD (km)
- Weir Location
- Fitzroy Barrage
- Saddle dams
- Highway
- Major Road
- Streets (Local)
- Railway
- Waterway
- Fitzroy Basin
- Property Boundary
- Rookwood Weir Stage 1 impoundment
- Rookwood Weir Stage 2 impoundment

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Revision B
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Rookwood Weir Project footprint

Figure 1-4

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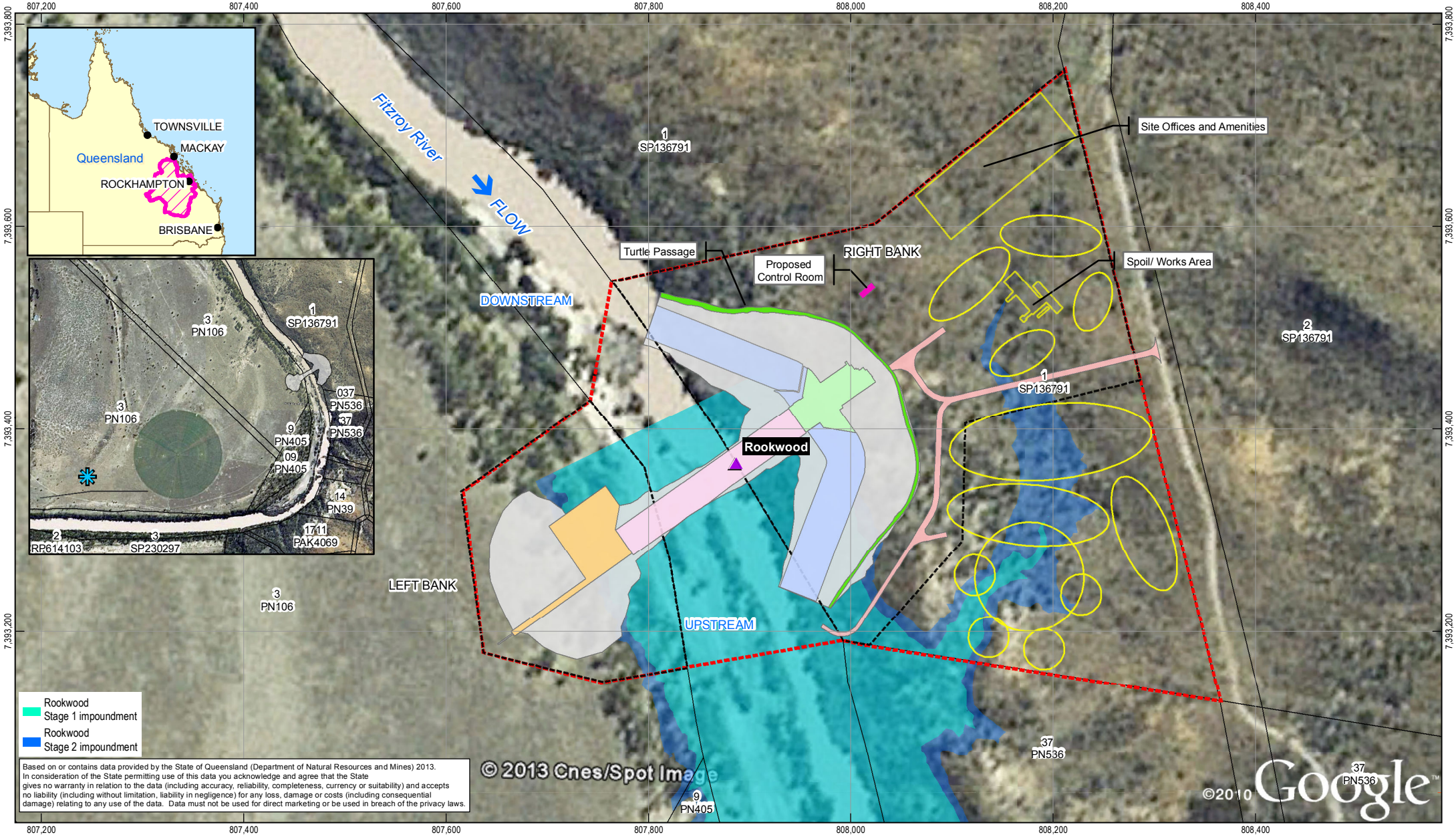

1:5,000 (at A4)

0 50 100 150 200

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- Fitzroy Basin
- Construction Area
- Proposed Property Acquisition Boundary
- Rookwood Weir proposed structure
- Construction Site Facilities
- Abutement, Wide Rock filled mattress
- Access Roads
- Channel
- Outlet works and fishway
- Proposed Control Room
- Spillway
- Turtle Passage
- Saddle Dam

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Rookwood Weir construction area

Figure 1-5

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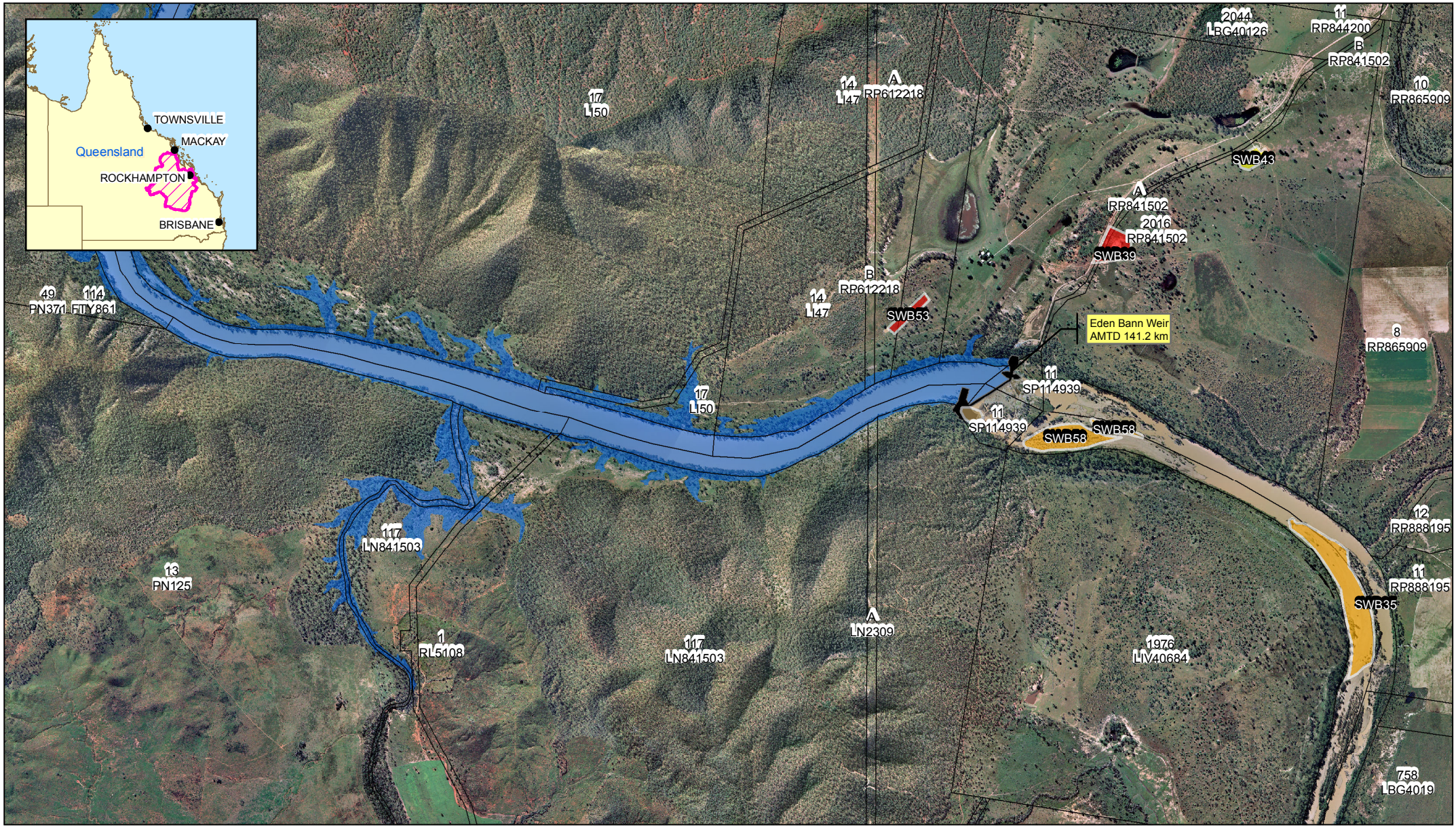

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0 200 400 600 800

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- Fitzroy Basin

Material Resources Areas

- Clay
- Gravel
- Sand
- Weathered Rock

Eden Bann Impoundment

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Eden Bann Weir - Potential construction material resource areas

Figure 1-6

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1:30,000 (at A4)

0 200 400 600 800

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- Fitzroy Basin

Material Resources Areas

- Clay
- Gravel
- Sand
- Weathered Rock
- Rookwood Impoundment

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Rookwood - Potential construction material resource areas

Figure 1-7

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1.3 Aims and objectives

The primary aims of the Fitzroy River turtle SMP are to:

- Provide a set of practical actions for the management of the Fitzroy River turtle during Project planning and design, construction and commissioning, and operation
- Set the framework for planning, implementing, maintaining and reviewing Fitzroy River turtle management requirements for the Project
- Reflect learnings from, and consistency across, projects within the Fitzroy Basin in relation to protection and enhancement of the species, specifically the Connors River Dam and Pipelines Project and Nathan Dam and Pipelines Project proposed by SunWater Limited.

Management actions have been developed to avoid and, if this is not possible, minimise impacts on the Fitzroy River turtle. Specific objectives include:

- Planning and design phase:
  - Avoid/minimise the potential for turtle injury and mortality through appropriate Project planning and design
  - Maintain upstream and downstream turtle movement and prevent the fragmentation of populations through appropriate Project design
- Construction and commissioning phase:
  - Avoid/minimise the potential loss of turtle habitat (aquatic and nesting)
  - Avoid/minimise the potential degradation of turtle habitat (aquatic and nesting)
  - Avoid/minimise the potential for turtle injury and mortality during construction
  - Maintain upstream and downstream movement of turtles during weir construction
- Operation phase:
  - Avoid/minimise the potential loss of turtle habitat (aquatic and nesting)
  - Avoid/minimise the potential degradation of turtle habitat (aquatic and nesting)
  - Avoid/minimise the potential for turtle injury and mortality during Project operation
  - Maintain upstream and downstream turtle movement and prevent the fragmentation of populations during Project operation.

Performance criteria for the achievement of the management actions are detailed in each of the corresponding management plans (Section 5).

1.4 Supporting information

The aquatic ecological assessment undertaken for the EIS included a targeted investigation into the population of Fitzroy River turtle within the Project footprints (Volume 1, Chapter 7 Aquatic fauna and Appendix L). This investigation included the following, for which detailed methodology is provided in Appendix L of the EIS:

- An assessment of habitat suitability throughout the Project footprints. The distribution and linear extent of aquatic habitat types within the Project footprints were quantified
- Targeted surveys for Fitzroy River turtle nesting activity. Potential turtle nesting banks were identified, mapped and assigned a broad nesting bank suitability rating

In addition literature reviews relevant to the Fitzroy River turtle within the Fitzroy Basin catchment were undertaken to inform the Fitzroy River turtle SMP, including the:

- Assessment of freshwater turtle populations within the Fitzroy Basin catchment specifically focusing on the proposal for raising Eden Bann Weir and constructing a new weir at Rookwood (Limpus et al. 2007). This assessment (conducted by DERM) involved field surveys within an extensive range of habitats throughout the Fitzroy Basin catchment including: isolated spring fed pools, farm dams, backwaters, weir pools and natural river habitats. Data collected included turtle abundance and diversity, distribution and aquatic habitats, life history parameters and nesting habitats. Findings were published in Limpus et al. 2011a.
- Assessments, EIS, supplementary EIS, the Coordinator-General's report on the EIS and the Australian Government's approval for the Connors River Dam and Pipeline Project (SKM 2010; SKM 2011; CoG 2012)
- Assessments and EIS for the Nathan Dam and Pipeline Project (SKM 2012).

1.5 Consultation

External specialist advice was garnered to guide the development of mitigation strategies for freshwater turtles in general and for the Fitzroy River turtle specifically. This included a review of literature and discussions with the Department of Environment and Heritage Protection's (DEHP) Chief Scientist, Aquatic Threatened Species Division, Dr Col Limpus. Information was specifically used to provide input into survey design, impact identification and development of appropriate mitigation measures.

1.6 Report structure

Table 1-1 outlines the structure of the Fitzroy River turtle SMP.

Table 1-1 Structure of the Fitzroy River turtle SMP

Section	Heading	Description of section contents
1	Introduction	Background to the Project and the Fitzroy River turtle SMP
2	Regulatory framework	Commonwealth, State and local government legislation and policy relevant to the Fitzroy River turtle SMP
3	Species overview	Information on the biology of the Fitzroy River turtle including distribution, habitat, nesting, ecology and primary threatening processes
4	Potential impacts	Information on the potential impacts to the Fitzroy River turtle as a result of the construction and operation of the Project
5	Management plans	Management and mitigation measures designed to avoid and, if this is not possible, minimise potential impacts to the Fitzroy River turtle during the planning and design, construction, and commissioning and operation phases of the Project. This section also details monitoring, responsible parties, reporting and corrective action requirements

2. Regulatory and policy framework

The Fitzroy River turtle SMP has been developed under guidance from and in accordance with the Commonwealth, State and local government legislation detailed in Table 2-1.

Table 2-1 Regulatory framework relevant to the Fitzroy River turtle SMP

Legislation	Summary
Commonwealth legislation	
EPBC Act	The EPBC Act provides a legal framework to protect and manage matters of 'National Environmental Significance' (NES). Matters of NES include: nationally and internationally important flora, fauna, ecological communities and heritage places. Approval is required for any project impacting on matters of NES. The Fitzroy River turtle is listed as vulnerable under the EPBC Act. In deciding whether to approve an action having a significant impact on a threatened species the Minister must among other things have regard to approved conservation advice for the species[1]. This SMP has been developed having regard to the approved conservation advice for the Fitzroy River turtle. It is expected that the Fitzroy River turtle SMP will be adopted as a condition to the approval of the Project by the Commonwealth Minister as is evidenced in similar projects such as the Connors River Dam and Pipeline Project.
EPBC Act Environmental Offset Policy	The EPBC Act Environmental Offset Policy outlines the Commonwealth Government's position on the use of environmental offsets to compensate for adverse impacts on matters of NES protected under the EPBC Act. Offsets seek to provide a net environmental gain through targeted actions both direct and indirect. The term 'environmental offset' refers to measures that compensate for the residual adverse impacts of an action on the environment after the implementation of avoidance and mitigation measures. Offsets are required under the EPBC Act Environmental Offset Policy if residual impacts are determined to be significant as defined in the Matters of *National Environmental Significance - Significant impact guidelines 1.1* (DoE 2013). Residual impacts to the Fitzroy River turtle as a result of the Project will require offsetting under the policy (Volume 2, Chapter 14 Offsets).
State legislation	
Environmental Protection Act 1994 (EP Act) and subordinate legislation	The EP Act outlines principles of ecologically sustainable development and the concept of General Environmental Duty (GED) as a foundation for individuals and organisations to avoid environmental harm. To prevent environmental harm, the GED established under s.319 of the EP Act must be observed and activities must be undertaken with due diligence. The GED states, "a person must not carry out any activity that causes or is likely to cause environmental harm unless the person takes all reasonable and practicable measures to prevent or minimise the harm". To act with due diligence, the parties must show that the environmental risk associated with the aspect has been assessed and minimised where possible.

[1] EPBC Act Section 139.

Legislation	Summary
NC Act	The NC Act is the principle Act in Queensland addressing nature conservation and administered by DEHP. The Nature Conservation (Wildlife) Regulation 2006 prescribes protected species of wildlife as presumed extinct, endangered, vulnerable, rare or common. The Fitzroy River turtle is listed as vulnerable under the NC Act. The Nature Conservation (Wildlife Management) Regulation 2006 prohibits tampering with an animal breeding place unless as part of an approved SMP. The Fitzroy River turtle SMP will be developed by a suitably qualified person and submitted for approval prior to Project development.
Water Act 2000 (Water Act) and subordinate legislation	The Water Act fulfils Queensland's responsibilities under the 1994 Water Resources Policy of the Council of Australian Government. It aims to address legislative requirements for the majority of Queensland's non-tidal waters. The Water Act sets out the law to rights in surface and groundwater, the control of works with respect to surface and groundwater conservation and protection, irrigation, water supply, drainage and flood control. Subordinate legislation to the Water Act, the Water Resource (Fitzroy Basin) Plan 2011 (Fitzroy WRP) and the Fitzroy Basin Resource Operations Plan 2004 (Fitzroy ROP) govern environmental flow releases.
Queensland Government Environmental Offsets Act 2014 (EO Act)	The EO Act provides a framework for the use of environmental offsets in Queensland to counter-balance unavoidable, negative environmental impacts that result from an activity or a development. Offsets are required for the significant residual impact to matters of State environmental significance, which include the Fitzroy River turtle. The Project Offset Strategy is provided in Chapter 22 of the EIS.
Local legislation	
Fitzroy Natural Resource Management (NRM) Region 'Back on Track' Biodiversity Action Plan	The Fitzroy NRM Region 'Back on Track' Biodiversity Action Plan (DERM 2010) prioritises species to guide conservation, management and recovery regardless of their current classification under the EPBC Act or NC Act. The Fitzroy River turtle is listed as 'High Priority' under the 'Back on Track' prioritisation framework for conservation management of Queensland's wildlife in the Fitzroy NRM region. While this tool has no legislative power, management and recovery actions for the species are outlined.

A report published by the DEHP (Limpus et al. 2011) identifies 10 management strategies for ensuring sustainable populations of freshwater turtles (*including R. leukops)* in the Fitzroy catchment. These strategies address the threats that impact on the population dynamics, habitats and sustainability of the species across the river system as a whole. Table 2-2 lists the 10 management strategies with reference to relevant Project measures.

Table 2-2 DEHP recognised management strategies and relevant Project measures

Management strategies		Project measures	Cross-reference
A	Improve recruitment and survivorship of hatchlings into the populations	Protection of nests within the project catchment to improve recruitment and survivorship of hatchlings.	Volume 2, Chapter 14 Offsets, Section 14.5.3
B	Maintain functional turtle nesting banks	Protection of nests within the project Fitzroy catchment to improve recruitment and survivorship of hatchlings.	Volume 2, Chapter 14 Offsets, Section 14.5.3
		Subject to compliance with the WRP and ROP, water release volumes and timing will be controlled to minimise the inundation of turtle nests downstream of the weir during nesting season.	Appendix M Species Management Program, Section 1.1
C	Maintain stream flow and high quality in-river habitat between impoundments	The operation strategy of the weirs will be dictated by the Environmental Flow Objectives in the Water Resource (Fitzroy Basin) Plan 1999 (WRP) and ROP. These objectives will aim to minimise environmental impacts as a results of the water infrastructure and will mimic natural flow conditions as much as possible.	Appendix M Species Management Program, Section 5.3 and 1.1 Volume 2, Chapter 13 Environmental management system
		A Water Quality Management Plan, Weed Management Plan, Feral Animal Control Program, Sediment and Erosion Control Plan and Hazardous Waste Management Plan will be developed and implemented in accordance with the Project EMP to maintain high-quality in-river habitat.	
D	Maintain continuity of turtle populations	Specifically designed turtle passage facility included in final detailed design. Monitoring will be undertaken in accordance with the Fitzroy River turtle Species Management Program and Offset Management Plan.	Appendix L Fitzroy River turtle technical report Section 4 Appendix M Species Management Program, Section 5.2
E	Reduce the incidence of death and physical injury of turtles at impoundment structures	The structural components of the weirs and associated works are designed (concept/preliminary design level) to minimise risks of turtle injury and mortality. The weir operating strategy will avoid/minimise risk of turtle injury and mortality. Specific operational actions will include: – Controlling the flow of water through release valves to provide gradual increments in water release volume – Operate planned releases at times when turtles are more likely to be away from weir infrastructure, if practical, noting water supply constraints, dam safety requirements/provisions, and operation safety may override this action	Appendix M Species Management Program, Section 5.2 Appendix L Fitzroy River turtle technical report Section 4.3.2

Management strategies		Project measures	Cross-reference
F	Manage recreational fishing and boating activities in impoundments to be compatible with maintenance of sustainable turtle populations and reduce unnecessary injury to turtles	There will be no provision of services, facilities or amenities to promote or encourage recreation use of the impoundments.	Appendix M Species Management Program, Section 5.4
G	Improve water quality within the Lower Fitzroy catchment	Weir design and operations will seek to reduce the potential for the release of poor quality water, through measures such as differential (multi-level) off takes, stilling basin, minimum operating levels	Volume 1, Chapter 11 Section 11.3 Volume 1 Chapter 2 Project Description
H	Increase the area of river and adjacent riverine habitat managed for conservation purposes.	Protection of nests within the project catchment to improve recruitment and survivorship of hatchlings. Offset provision for loss of aquatic habitat	Volume 2, Chapter 14 Offsets, Section 14.5.3 Volume 1, Chapter 22 Offsets, Section 22.3.2
I	Increase stake-holder participation, including Indigenous traditional owner participation, in conservation and management processes for these species	Engagement will be ongoing with DEHP during implementation of the Fitzroy River Turtle Species Management Program and Offset Management Plan. Commitment has also been agreed to partner with Greening Australia in the implementation of the nest protection measures.	Appendix M Species Management Program, Section 5.4 Chapter 14 Offset Management Plan section 14.5.3.5
J	Monitor the response of turtle populations in the Fitzroy catchment to the management strategies and evaluate the effectiveness of these strategies.	Monitoring will be undertaken in accordance with the Fitzroy River Turtle Species Management Program and Offset Management Plan	Appendix M Fitzroy River turtle Species Management Program Section 5 Management Plans Chapter 14 Offset Management Plan section 14.5.3.5

3. Species overview

3.1 Introduction

This section of the Fitzroy River turtle SMP provides an overview of the Fitzroy River turtle as relevant to the management of the species throughout the Project. Additional background information can be found in Appendix Q1 of the Project EIS.

3.2 Description

The Fitzroy River turtle (Figure 3-1) has a maximum straight carapace (shell) length of 260 mm. The carapace is broadly oval and medium to dark brown in colour. The plastron, or underside of the shell, varies from pale yellow to cream. Tubercles are present on the neck and orange markings can be seen on the sides of the neck and throat of large males. The Fitzroy River turtle has a distinctive white ring around its eye. The feet are fully webbed and five claws are present on each forelimb. The shell of hatchlings turtles is serrated along the back edge and the ring around the eye is metallic silver-blue (Cogger 2000; Wilson and Swan 2003; Latta and Latta 2005; Limpus et al. 2007; Limpus et al. 2011a).

Figure 3-1 Fitzroy River turtle identified at the Fitzroy River Barrage fish ladder (October 2008)

3.3 Distribution and habitat

The Fitzroy River turtle is endemic to the Fitzroy Basin catchment with the known species' distribution extending from the Fitzroy Barrage to at least Theodore Weir (at 228.7 km AMTD) on the Dawson River, and within the lower reaches of the Nogoa River and upper reaches of the Connors River (in the vicinity of the proposed Connors River Dam at 95.7 km AMTD) (Table 3-1). Important habitat areas relevant to the Project footprint (Leger and Cann 1980; Cann 1998; Limpus et al. 2007; Limpus et al. 2011a) are listed below and illustrated in Figure 3-2:

- Glenroy Crossing – essential habitat and type locality[2] within Eden Bann Weir Project footprint, upstream of the existing impoundment
- Redbank Crossing – type locality within the Eden Bann Weir Project footprint, upstream of the existing impoundment
- Marlborough Creek – essential habitat just upstream of Eden Bann Weir Project footprint
- Between Boolburra rail crossing and Capricorn Highway – essential habitat just upstream of Rookwood Weir Project footprint
- Alligator Creek – important nesting habitat within the Fitzroy River Barrage impoundment, downstream of Eden Bann Weir Project footprint.

The Fitzroy River turtle is considered to be a specialist species that occupies freshwater habitats within the river channel. Riffle zones are considered particularly important habitat, however, the species also inhabits pools, runs and creeks. Foraging in these habitats is generally associated with in-stream debris such as fallen logs. Undercut banks, root mats, logs and rocks provide important sheltering habitat. Whilst flowing waters are thought to be preferred by the species, the Fitzroy River turtle retreats into non-flowing, potentially isolated pools during the dry season (Limpus et al. 2007; Limpus et al. 2011a). The Fitzroy River turtle is also known to inhabit the shallow upstream margins of impoundments such as the Fitzroy Barrage and Neville Hewitt Weir impoundments (Limpus et al. 2007; Limpus et al. 2011a). The deep water areas (> 5 m) of impoundments are, however, largely uninhabitable to the turtle species due to very low oxygen levels, little or no light penetration and cold temperatures. The Fitzroy River turtle is not known to occur in off-stream habitats such as farm dams, billabongs, or flood plains (Limpus et al. 2007; Limpus et al. 2011a).

3.4 Nesting

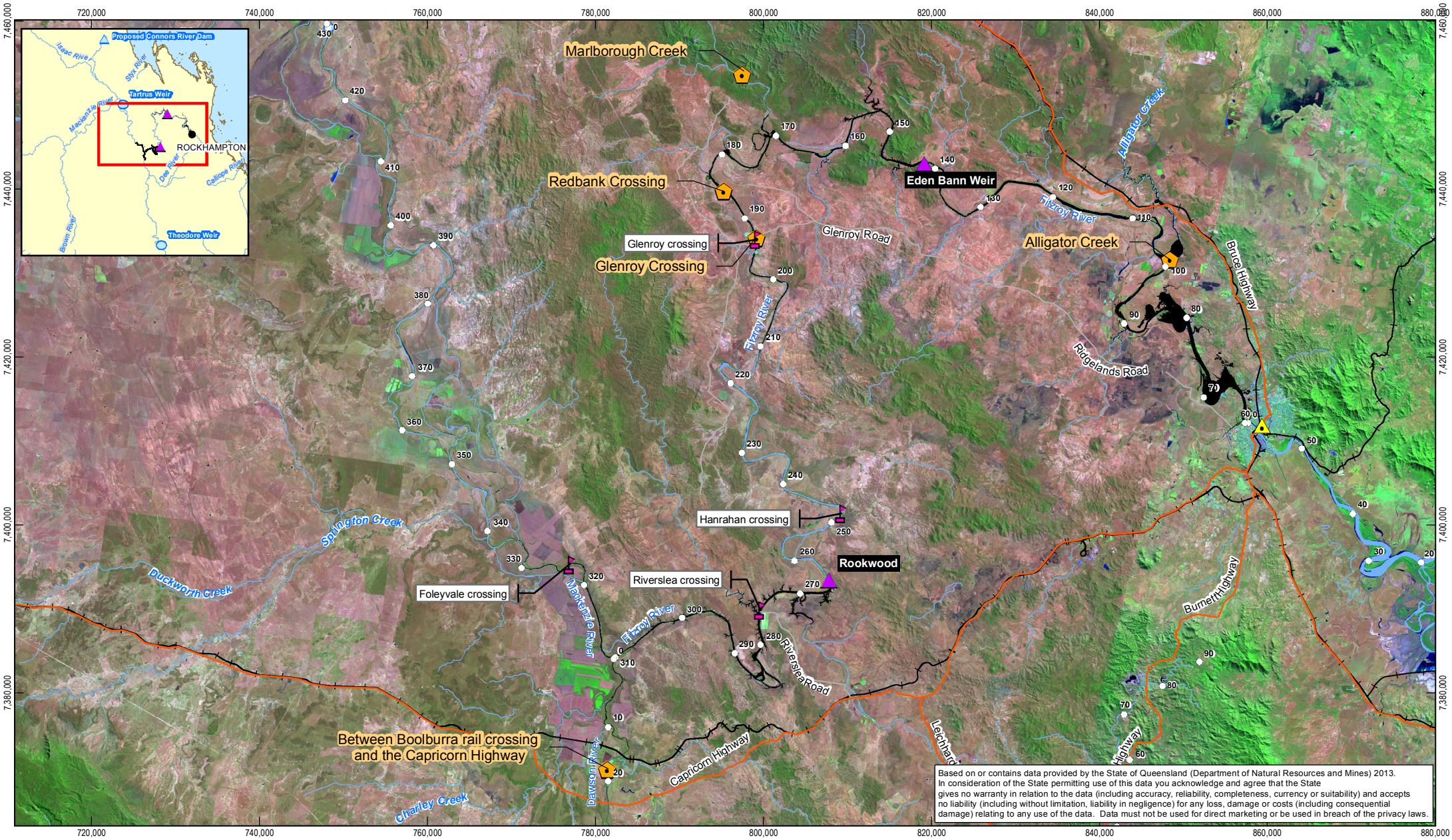
Nesting in the Fitzroy River is generally restricted to alluvial sand/loam banks which are deposited during flood events (Figure 3-). There is insufficient evidence available on species specific nesting requirements to accurately describe optimal nesting bank conditions, however, banks with a relatively steep slope, low density of ground/understorey vegetation and partial shade cover appear to be preferred (Limpus et al. 2007; Limpus et al. 2011a). Nesting generally occurs approximately 5-6 m from the water's edge (Limpus et al. 2007; Hamann et al. 2007; Limpus et al. 2011a). Females can lay two or more egg clutches per year during spring (September-November) with hatching occurring during summer (November-March) (Limpus et al. 2007; Limpus et al. 2011a; Limpus et al. 2011b).

[2] Type locality is the location where a holotype (i.e. the specimen on which the original description of a species is based) was found.

Table 3-1 Known distribution of the Fitzroy River turtle

Known distribution within the catchment		Abundance and survey reference (N=number of turtles)
Project footprints	Marlborough Creek – Fitzroy River	N = 6 - Limpus et al. 2007; Limpus et al. 2011a N = 8 - Gordos and Franklin 2002; Gordos et al. 2003 Confirmed record - Cann 1998
	Redbank Crossing – Fitzroy River	N = 2 deceased - Limpus et al. 2007; Limpus et al. 2011a N = 38 - Legler and Cann 1980 N = 8 - Legler 1977 N = 2 nests - Legler and Cann 1980
	Glenroy Crossing– Fitzroy River	N = 13 live; 14 deceased - Limpus et al. 2007; Limpus et al. 2011a Confirmed nesting - Limpus et al. 2007 N = 11 - Tucker et al. 2001 Confirmed record - Legler and Cann 1980
	Rookwood Weir site – Fitzroy River	N = 3 deceased - Limpus et al. 2007; Limpus et al. 2011a
	Foleyvale Crossing – Mackenzie River	N = 1 deceased - Limpus et al. 2007; Limpus et al. 2011a
Downstream of Eden Bann Weir Project footprint	Fitzroy River Barrage impoundment	N = 1 – Project EIS surveys
	Alligator Creek junction – Fitzroy River	N = 4* live; 3* deceased - Limpus et al. 2007; Limpus et al. 2011a N = 10 confirmed nesting banks - Limpus et al. 2007; Limpus et al. 2011a
	Wattlebank Control Weir – Fitzroy River	N = 5 - frc 2007
Upstream of Rookwood Weir Project footprint	Windah Creek – Fitzroy River	Confirmed record - Legler and Cann 1980
	Gainesford – Dawson River	Confirmed record - Legler and Cann 1980
	Downstream of Theodore Weir – Dawson River	N = 118 - Limpus et al. 2007; Limpus et al. 2011a
	Duck ponds – Nogoa River	Confirmed record - Limpus et al. 2007; Limpus et al. 2011a
	Cardowan irrigation farm – Connors River	N > 12 - Limpus et al. 2007; Limpus et al. 2011a
	Cardowan irrigation farm – Connors River	N = 2 nests - Limpus et al. 2007; Limpus et al. 2011a
	Connors River	N = 16 - Gordos et al. 2003
	Downstream of the proposed Connors River Dam – Connors River	N = 16 – frc 2010 N = 182 – frc 2011
	Downstream of Tartrus Weir – Mackenzie River	N = 78* – Limpus et al. 2011b N = 92 nests - Limpus et al. 2011b
	Tartrus Weir impoundment – Isaac River	N = 17 nests - Limpus et al. 2011b N = 1 - Limpus et al. 2011b

* Cumulative total from multiple survey events.



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Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- AMTD (km)
- Weir Location
- Fitzroy Barrage
- River Crossing
- Highway
- Minor Road
- Waterway
- Railway
- Impoundment Area
- Fitzroy river turtle important habitat areas
- Essential Habitat fitzroy river turtle
- Existing weir
- Proposed Connors River Dam

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Fitzroy River turtle important habitat areas

Figure 3-2

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Level 9, 145 Ann St Brisbane QLD 4000 **T** 61 7 3316 3000 **F** 61 7 3316 3333 **E** bnemail@ghd.com.au **W** www.ghd.com.au

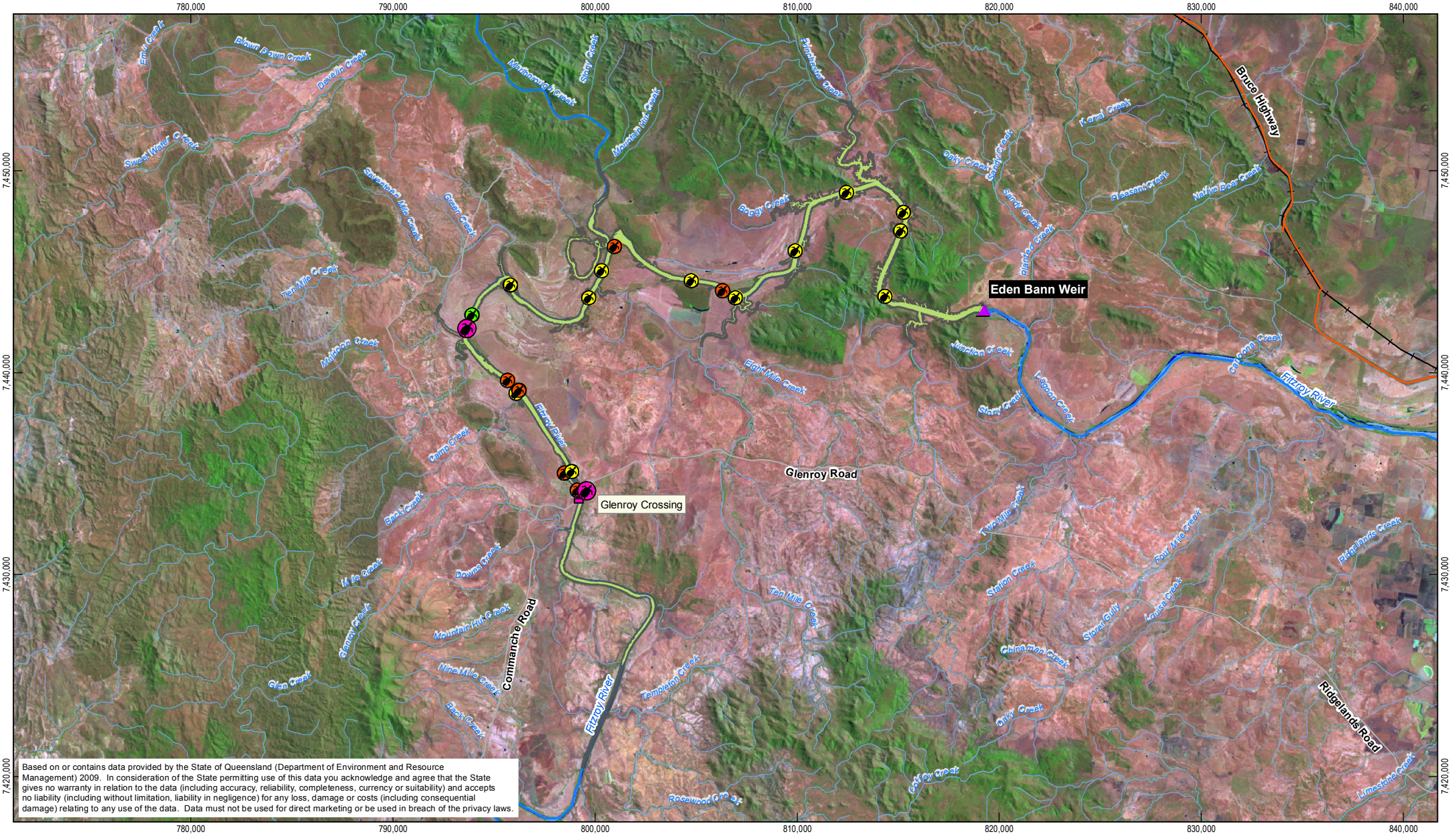
Data Source: © Copyright Commonwealth of Australia (Geoscience Australia): Waterways, State (2007); Sunwater: Waterways, Weir Locations - 2008; DNRM: Roads - 2010, Railways - 2010, Weirs - 2010, Imagery/2005, Essential Habitat /2011; GHD: Proposed Dam - 2014. Created by: MS

Figure 3-3Potential turtle nesting bank in Rookwood Weir Project footprint (left) and Eden Bann Weir Project footprint (right)

Important nesting habitat occurs at Alligator Creek located within the upper reaches of the Fitzroy Barrage impoundment (40 km downstream of Eden Bann Weir at approximately 100 km AMTD). This area supports the largest known Fitzroy River turtle nesting aggregation. Additional nesting aggregations have also been recorded immediately downstream of Tartrus Weir on the Mackenzie River and within the upper reaches of the Tartrus Weir impoundment on the Isaac River (Table 3-1; Limpus et al. 2011b).

Within the Project footprint, isolated nests of the Fitzroy River turtle have been historically recorded at Glenroy and Redbank Crossings (Table 3-1). Turtle nesting activity was also identified at six nesting banks within the Rookwood Weir Project footprint during Project EIS field surveys (Chapter 7 Aquatic fauna and Appendix Q1). Predated egg shell from five of these banks was identified as potential Fitzroy River turtle. Two nests recorded at the Rookwood Weir site were confirmed as white-throated snapping turtle (*Elseya albagula*). Due to the similarity in nesting bank requirements between the Fitzroy River turtle and the white-throated snapping turtle, the Rookwood Weir site is considered to provide highly suitable habitat for Fitzroy River turtle nesting. Two additional banks, one within the Rookwood Weir Project footprint and one within the Eden Bann Project footprint, were identified as being highly suitable (although unconfirmed) for Fitzroy River turtle nesting. The location of potential Fitzroy River turtle nesting habitats within the Eden Bann Weir Project footprint and Rookwood Weir Project footprint are shown in Figure 3-4 and Figure 3-5, respectively.

Classification of a bank as potential nesting habitat does not guarantee nesting does/will occur. Turtle nesting may also occur in areas not identified as potential habitat however, the occurrence is expected to be low. Nesting bank conditions are subject to change over time, for example as a result of flooding events, and as such the suitability of the habitat for turtle nesting may vary. Mapped nesting location may represent a series of adjacent nesting banks.



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0 2.5 5 7.5 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- River Crossing
- Highway
- Minor Road
- Waterway
- Waterway
- Railway
- Eden Bann Weir Stage 2 impoundment
- Eden Bann Weir Stage 3 impoundment
- High Potential Turtle Nesting Suitability
- Medium Potential Turtle Nesting Suitability
- Low Potential Turtle Nesting Suitability
- Historical Turtle Nesting Site

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Location of potential turtle nesting banks within the Eden Bann Weir Project footprint

Figure 3-4

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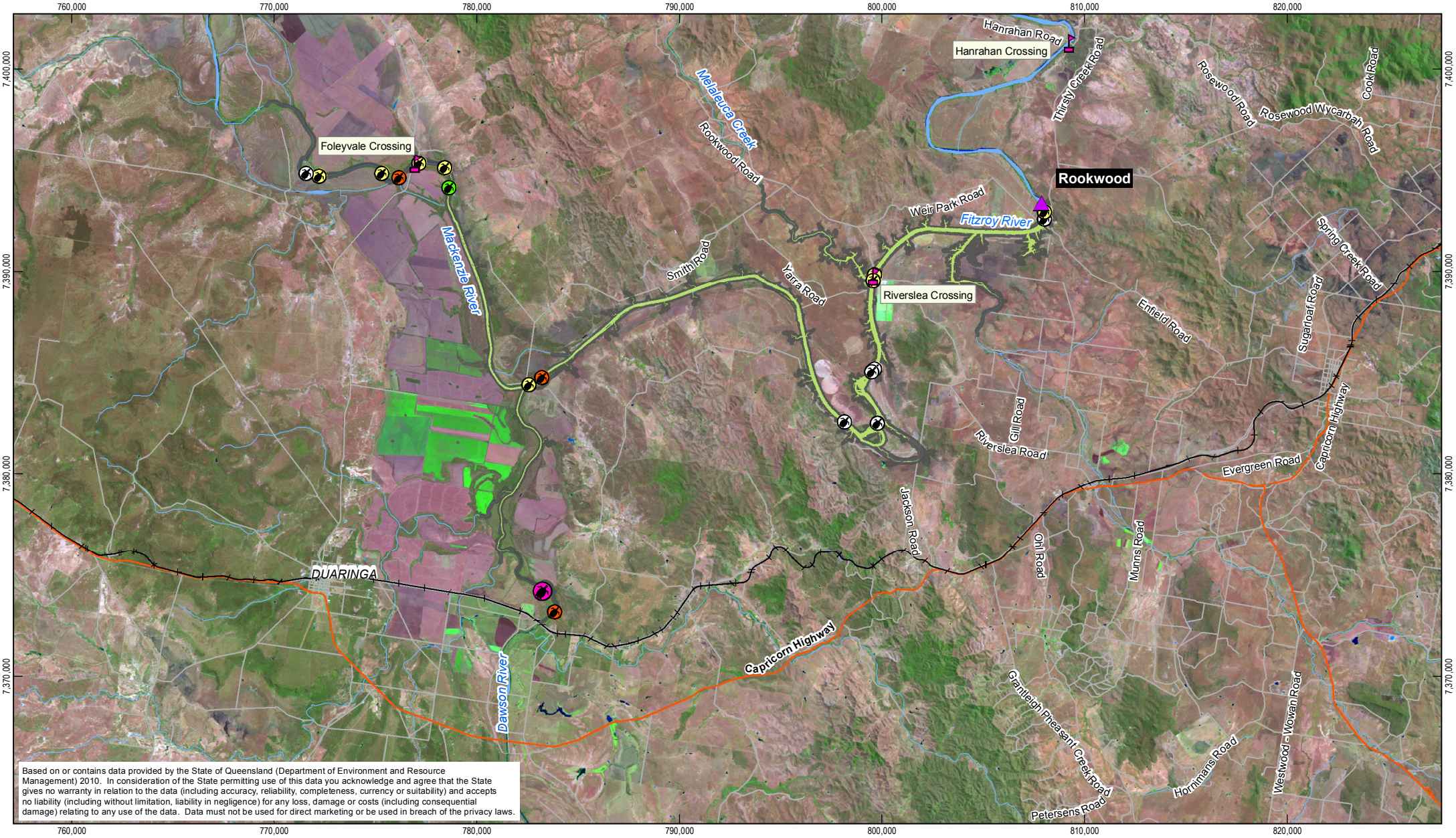
G:\41\20736\GIS\Projects\MXD\900_Baseline Terrestrial Fauna Report\4120736_910_Eden_Bann_Potential_Turtle_Nesting_Sites_Rev_D_Fig4.mxd

Data Source: © Copyright Commonwealth of Australia (Geoscience Australia): Waterways, State (2007); Sunwater: Waterways, Weir Locations - 2008; DNRM: Roads - 2010, Railways - 2010, DERM - Imagery/2005; GHD: Fauna Survey - 2009. Created by AJ



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0 2.5 5 7.5 10

Kilometres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Weir Location
- River Crossing
- Railway
- Highway
- Minor Road
- Waterway
- Rookwood Weir Stage 1 impoundment
- Rookwood Weir Stage 2 impoundment
- Confirmed Turtle Nesting Site
- High Potential Turtle Nesting Suitability
- Medium Potential Turtle Nesting Suitability
- Low Potential Turtle Nesting Suitability
- Historical Turtle Nesting Site

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Fitzroy of potential turtle nesting banks within the Rookwood Weir Project Footprint

Figure 3-5

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Data Source: © Copyright Commonwealth of Australia (Geoscience Australia): Waterways, State (2007); Sunwater: Waterways, Weir Locations - 2008; DNRM: Roads - 2010, Railways - 2010, Imagery/2005; GHD: Fauna Survey - 2009. Created by MS

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3.5 Ecology

The Fitzroy River turtle is one of a unique group of Australian freshwater turtles that can extract oxygen from both the air and the water. Aerial respiration is achieved via the lungs at the water's surface, whilst aquatic respiration occurs underwater via gill like structures in the cloaca (Priest and Franklin 2002). The ability to respire aquatically allows the Fitzroy River turtle to remain underwater for weeks at a time during ideal conditions (Priest 1997; Gordos et al. 2003). Benefits of aquatic respiration include: increased time available for foraging and breeding, reduced exposure to predation and reduced energy expenditure (Gordos 2004; Clark 2008). The ability of the Fitzroy River turtle to respire aquatically also allows this species to inhabit fast-flowing riffle zones where primarily air-breathing species may be excluded (Gordos 2004).

The Fitzroy River turtle has a unique foraging technique of 'scrape feeding' whereby the turtle uses the horny sheaths of the upper jaw to scrape the surface of the substrate, particularly submerged logs and rocks. This method of foraging primarily captures slow moving benthic invertebrates, invertebrate eggs, aquatic insects, sponges and algae (Leger and Cann 1980; Rogers 2000; Tucker et al. 2001; Limpus et al. 2007; Limpus et al. 2011a). Food resources for the Fitzroy River turtle can often be in short supply within natural pools and impounded habitats. Access to highly productive riffle zones or flowing shallow water margins assist in the accumulation of fat reserves that are utilised by the species for breeding during the dry season (Limpus et al. 2007; Limpus et al. 2011a).

Little is known about the movement patterns of the Fitzroy River turtle. Studies to date suggest that home range size is relatively small (up to four hectares) with local movement generally occurring between riffle zones and adjacent pools. Large scale movements in the order of tens of kilometres may potentially occur for the purpose of dispersal, courtship and nesting migrations and repositioning following flood displacement (Tucker et al. 2001). Movement over land is only known to occur between adjacent pools. Rainfall is thought to act as a trigger for turtle movement with individuals observed attempting to move past impoundments during rainfall and small flow events (Limpus et al. 2007; Limpus et al. 2011a; Limpus et al. 2011b). The habitat and movement requirements of hatchling turtles are unknown.

3.6 Threatening processes

The biggest threat to the survival of the Fitzroy River turtle is the lack of recruitment into the population (Limpus et al. 2007; DERM 2010; Limpus et al. 2011a). Predation of nesting banks by feral animals, goannas and water rats and trampling of nests by cattle results in extremely poor survival of egg clutches. The bias in favour of adult turtles within the Fitzroy Basin catchment indicates that low recruitment of hatchlings has been occurring over many decades (Limpus et al. 2007; Limpus et al. 2011a). At the current rates of recruitment, the population of Fitzroy River turtles within the catchment is not considered sustainable (Limpus et al. 2007; Limpus et al. 2011a).

Other threatening processes include: loss of habitat; alteration of natural flow regime; movement barriers; physical injury and mortality; and poor water quality. The potential impacts on the Fitzroy River turtle that may arise as a result of the Project are likely to be analogous to those caused by the processes which are currently affecting the species throughout the Fitzroy Basin catchment. These processes are discussed further in Table 3-2.

Table 3-2 Existing threatening processes acting on Fitzroy River turtle in the Fitzroy Basin catchment

Existing threatening process	Description	Impact on the Fitzroy River turtle
Nest predation	Freshwater turtles within the Fitzroy Basin catchment have extremely high nest predation rates with close to 100 % of clutches predated each season (Limpus et al. 2007; DERM 2010; Limpus et al. 2011a; Limpus et al. 2011b). The high mortality of eggs has led to little to no recruitment of hatchlings into the population over the last decade. The population of Fitzroy River turtles is now primarily comprised of adult individuals. The key predators of freshwater turtle nests include: foxes, dogs, pigs, cats, goannas and water rats. Trampling of nests by cattle has also contributed to the low level of recruitment (Limpus et al. 2007; DERM 2010; Limpus et al. 2011a).	• Low population recruitment • Disruption to population age structure.
Loss of habitat	The natural pool-riffle-run sequences and alluvial sand banks within the Fitzroy Basin catchment provide preferential habitat for the Fitzroy River turtle. The construction of impoundments throughout the catchment has inundated a large proportion of these natural habitats. The conversion of the heterogeneous lotic habitat into homogeneous lentic habitat has resulted in the loss of turtle foraging, sheltering and nesting habitat (Limpus et al. 2007; DERM 2010; Limpus et al. 2011a).	• Reduction in heterogeneity of aquatic habitats • Decrease in foraging and sheltering resources • Increase in competition from generalist species • Decrease in availability of nesting habitat.
Alteration of natural flow regime	The construction of in-stream storage infrastructure and water extraction within the Fitzroy Basin catchment has altered the natural flow regime of the system. Flows within the impoundments are reduced to zero or slow flowing conditions (excluding flooding events) while, downstream conditions vary according to operational releases. The reduction in flows within impoundments has resulted in a change in aquatic habitat conditions including water quality and the diversity and abundance of foraging resources (e.g. macrophytes, macroinvertebrates, benthic invertebrates). Suitable habitat conditions occur in the upper reaches of impoundments and the Fitzroy River turtle has been recorded inhabiting these areas (Limpus et al. 2007; Limpus et al. 2011a). Operational water releases that increase water levels downstream during the turtle nesting season may also inundate turtle nests.	• Alteration of habitat • Reduction in foraging resources • Inundation of turtle nests.

Existing threatening process	Description	Impact on the Fitzroy River turtle
Movement barriers	In-stream infrastructure and resulting impoundments within the Fitzroy Basin catchment have created physical barriers that inhibit the upstream and downstream movement of turtles. Whilst the home range size of the Fitzroy River turtle is generally relatively small, individuals are thought to undertake long-distance migrations for the purpose of dispersal, courtship and nesting, and repositioning following flood displacement. Restriction of long-distance movement can lead to a disruption in reproductive behaviours and the creation of genetically isolated populations (Limpus et al. 2007; Limpus et al. 2011a).	• Restriction of long-distance movement • Disruption to reproductive behaviours (e.g. courtship and nesting) • Fragmentation of populations.
Physical injury and mortality	The structural and operational design of in-stream infrastructure and impoundments has resulted in high levels of turtle injury and mortality. Specifically, mortalities are known to occur as a result of entrapment on trash screens, contact with hard structures during spilling events and during water discharge (Limpus et al. 2007; Limpus et al. 2011a). Turtle injury and mortality has also increased as a result of human recreation activities with causes of turtle injury and mortality including crab trap drowning, fish hook injuries and boat strikes (Limpus et al. 2007; Limpus et al. 2011a).	• Decline in turtle health • Decrease in population size.
Poor water quality	Land use practices in the Fitzroy Basin, such as agriculture and mining, have led to various pressures being placed on the aquatic ecosystems and species that occur in the waterways of the Basin. Of particular concern is the deterioration of water quality due to excess sediments, nutrients, dissolved salts and agrochemical and metal concentrations (Johnston et al., 2008). The reductions water quality within the catchment has led to the degradation of turtle habitat and food resources and may be responsible for a reduction in turtle heath (Limpus et al. 2007; DERM, 2008; Limpus et al. 2011a). Increased run-off from agricultural/pastoral lands has also increased the levels of toxic chemicals within the Fitzroy Basin catchment. Whilst the chemicals are currently below guideline levels, their effect on the health of freshwater turtles is unknown. Bimodally respiring species are likely to be more sensitive to toxic chemicals than primarily air-breathing species (Limpus et al. 2007; DERM 2010; Limpus et al. 2011a). Changes in water quality conditions, particularly reduced oxygen levels, may reduce aquatic respiration and dive duration in turtles. Alteration of respiratory physiology and diving behaviour may lead to a reduction in foraging and breeding rates, and increase in predation levels (Clark 2008). An increase in predation levels of hatchlings is likely to compound the extremely high rates of nest predation currently occurring throughout the catchment.	• Degradation of habitat – reduction in the diversity and abundance of food resources • Alteration of respiratory physiology and diving behaviour – potential reduction in turtle health and increase in predation levels.

4. Potential impacts

The augmentation/construction and operation of weir has the potential to exacerbate existing threatening processes occurring throughout the Fitzroy Basin catchment. Construction activities are expected to occur over two consecutive dry seasons. Impoundment is expected to occur within a single wet season during which commissioning will take place.

Table 4-1 summarises the potential Project impacts. Further detail is provided in Chapter 7 Aquatic fauna and Appendix Q1 of the Project EIS.

Table 4-1 Potential impacts of the Project on the Fitzroy River turtle

Mechanism	Impact on the Fitzroy River turtle
Construction and commissioning phase	
Loss of vegetation and excavation within the bed and banks	• Loss of foraging and sheltering resources • Loss of potential nesting habitat • Potential injury and mortality of individuals.
Vehicle and plant movement to, from and around the construction footprints	• Potential injury and mortality of individuals and eggs • Degradation of habitat through the introduction and spread of introduced weeds and pests.
Storage or spillage of potentially hazardous materials	• Degradation of habitat within and downstream of the construction footprints • Potential injury and mortality of individuals and eggs exposed to hazardous materials.
Construction within the waterway	• Restriction of upstream and downstream movement as a result of flow diversion and/or control • Degradation of habitat as a result of point-source pollution from sedimentation, run-off and dust emission • Degradation of habitat as a result of light, noise and vibration disturbance • Alteration of respiratory physiology and diving behaviour due to a reduction in water quality.
Resource extraction areas	• Loss of potential nesting habitat • Degradation of habitat through disturbance, sedimentation and increased turbidity.
Commissioning -water capture and storage behind the weir	• Reduction in heterogeneity of aquatic habitats within the impoundments – loss of pool-riffle-run sequences • Reduced/altered availability of foraging and sheltering resources (including microhabitats) • Inundation of confirmed and potential nesting habitat • Increased predation of eggs/hatchlings and trampling of nests by cattle.
Operation phase	
In-stream barrier operation	• Restriction of upstream and downstream movement of turtles and fragmentation of the turtle population • Potential injury and mortality of individuals as a result of structural and operational design.

Mechanism	Impact on the Fitzroy River turtle
Altered flow regimes (including management of storage)	• Degradation of habitat as a result of changes to water quality (upstream and downstream of infrastructure) • Alteration of respiratory physiology and diving behaviour due to a reduction in water quality • Potential alteration of downstream nesting habitat due to reduced sediment transport and increased weed abundance • Inundation of turtle nests as a result of fluctuations in water levels within and downstream of the impoundments.

5. Management plans

5.1 Overview

Management plans have been developed in response to the impacts identified in Section 4. For each Project phase the management plans set out:

- Operational policy
- Legislative compliance requirements
- Performance criteria
- Implementation strategy
- Monitoring
- Corrective action
- Responsible parties.

The Fitzroy River turtle SMP will be implemented in association with the Project Environmental management plan (EMP) (Chapter 23 EMP). The proposed management plans have been designed to specifically target the Fitzroy River turtle but the management actions proposed will provide a broad scale benefit to aquatic species and habitats.

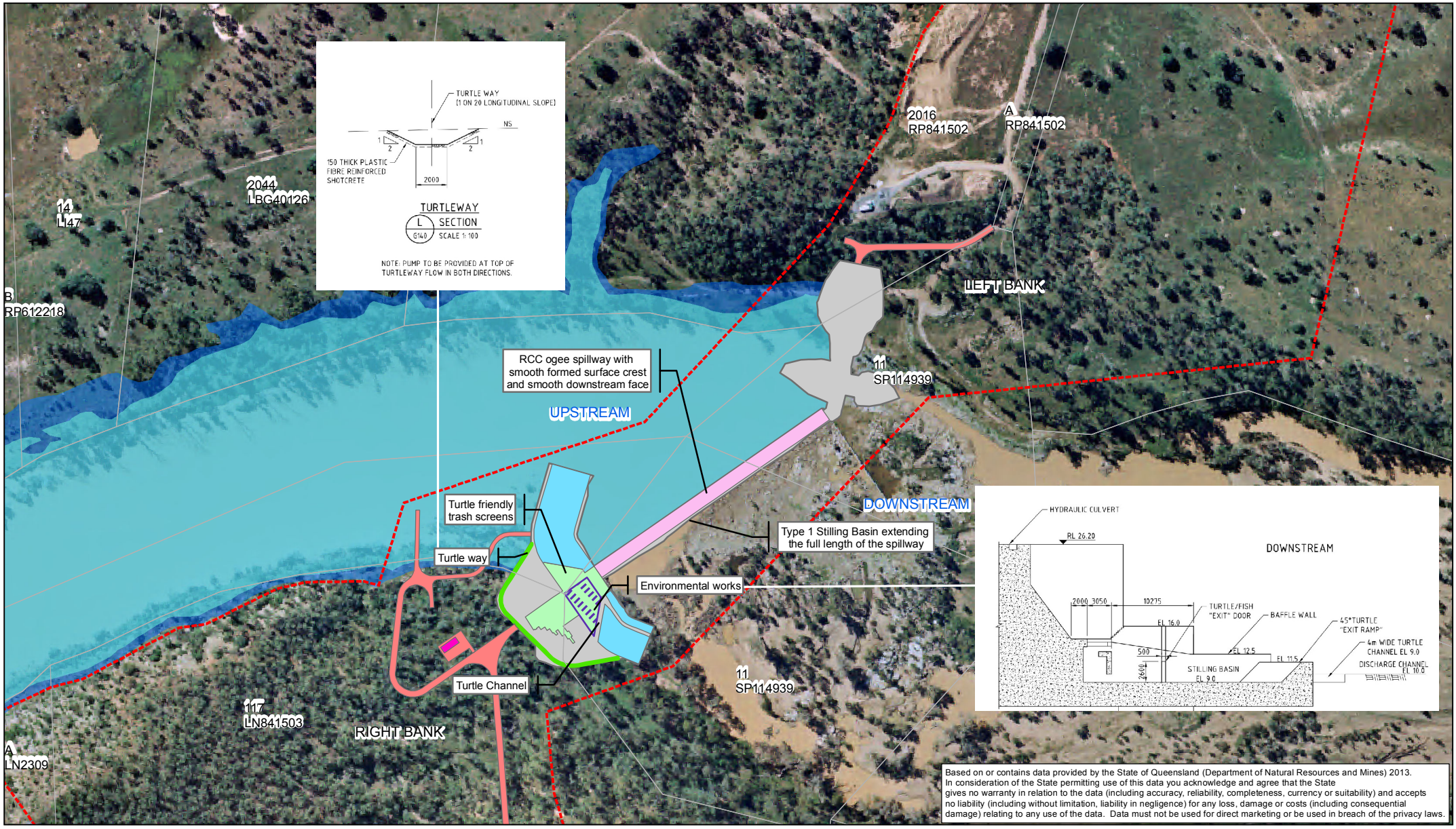
5.2 Planning and design management plan

Element	
Operational policy	• Avoid/minimise the potential for turtle injury and mortality through appropriate Project planning and design • Maintain turtle movement upstream and downstream of the weirs through appropriate design.
Legislative compliance requirements	• EPBC Act • NC Act and Nature Conservation (Wildlife Management) Regulation 2006 (Qld). • The Fitzroy River turtle SMP will be developed by a suitably qualified person and submitted for approval prior to Project development.
Performance criteria	• Design features specific to turtle protection included in final detailed design • Specifically designed turtle passage facility included in final detailed design.
Implementation strategy	• The structural components of the weirs and associated works are designed (concept/preliminary design level) to minimise risks of turtle injury and mortality. Specific design features of Eden Bann Weir and Rookwood Weir are detailed in Figure 5-1 and Figure 5-2, respectively, and include: – A roller compacted concrete (RCC) ogee spillway to provide a smooth formed surface finish at the crest of the weir in the spillway section – A smooth downstream face of the spillway section – Type 1 stilling basin to minimise exposure to extreme turbulence and the presence of hard structures (such as dissipater teeth) that turtles can collide with – Stilling basin that extends the full length of the spillway to prevent turtles being projected against hard concrete during spilling events – Spillway gates have been designed such that when they close the shape mirrors that of the ogee crest. This limits turtle entrapment at

Element	
	the edge or under gates – Outlet works and fishway gates that close to prevent turtles aggregating in areas of intermittent high velocity water flow – Outlet works and fishway gates that prevent turtles from being crushed when closing – Sloped (45 degree) ramp to allow turtles to exit the environmental flow outlet area – Channel downstream of the environmental flow area to build tailwater and prevent turtles landing on hard concrete when exiting this area – A sloped entrance to the environmental flow gates lined with slippery substrate to prevent turtles accessing the area immediately in front of the gates during no flow periods – Smooth stainless steel plates to discourage turtles from climbing into unsafe locations – Slot in environmental flow area baffle wall to allow turtles to exit the area – Trash screens to prevent turtles entering the outlet works from the impoundment or being trapped by high water pressures on the upstream side of the outlet works – Trash screens have been designed so that the water pressure on the face of the screen will not trap turtles – Trash screens that allow for turtles to grip and climb. • Discussions with DEHP will be held during the detailed design phase to further refine the turtle protection design features and identify any additional options for minimising the potential for turtle injury and mortality. Design features identified to date for further consideration include: – A section of the internal wall of the low flow outlet chamber to be sloped and have a roughened surface to allow turtles to exit this area – Slopping or increasing the surface area of the trash screens to decrease velocities so that turtles can readily surface. This will be dependent on maintenance considerations such as screen cleaning – Slope trash screens so sweeping velocities push turtles towards the surface – Measures to prevent turtles climbing the ogee crest of the spillway when the impoundment is at FSL and no flow is occurring into the stilling basin area. This may include a slippery surface such that turtles cannot congregate on the crest – Computational fluid dynamics (CFD) modelling of turbulence conditions in the stilling basin to be undertaken and design modified (if required) to provide hydraulic flow paths that allow turtles to escape extreme turbulence locations – CFD modelling of trash screen velocities to assess suitability for turtles – Subject to occupational health and safety legislation and dam safety regulations design features to facilitate access to weir infrastructure for monitoring of turtle populations. • Include a specifically designed (concept level) turtle way (turtle ramp) at

Element	
	each weir. The turtle ramps are shown in Figure 5-1 and Figure 5-2. Specific design features currently include: – Provides for both upstream and downstream passage – Provides passage in all headwater/tailwater conditions from dead storage up to drown out of the weirs – Provides passage on the bank adjacent to the main river channel – Entry and exit points sloped and located at the river margins where turtles can assess them at low velocity conditions – Slope suitable for turtle climbing, not more than 45° at any point – Width of 2 m – A shotcrete or roughened concrete lined channel to provide a roughened surface for climbing – Small attraction flow maintained by a pump – Mesh grid cover to provide natural light where the ramp passes through the abutment of the weir. • Discussions with DEHP will be held during the detailed design phase to further refine the design of the turtle ramp at each weir. Design features identified to date for further consideration include: – Locations and numbers of resting pools (at least every 15 m and with a minimum depth of 0.5 m) and provision of shade and shelter along the ramp – Specific protection measures for hatchling and juvenile turtles (for example shelter along the ramp) – Measures to facilitate monitoring (active and passive). This may include pit tag scanners, remote sensing cameras, trap attachment points and turtle trapping facilities – Options to decrease the length of the turtle passage. Options to reduce length may include increasing the slope of the ramp or adding steps (maximum step height of 0.02 m) – Options to facilitate downstream passage – Ability to modify the turtle ramp in terms of structure, operation and monitoring. • A turtle movement study will be implemented on commencement of a Project trigger to improve current knowledge of Fitzroy River turtle movement patterns, home range and seasonal variations through monitoring and tracking. The study would be implemented through a university research program (or similar approach with qualified experts in the field) in collaboration with DEHP. The study would further inform the requirements of turtle passage and will facilitate quantifiable performance criteria to measure the effectiveness of the passage once operational. The proposed study will include: – Use of passive integrated transponder (PIT) tags to monitor turtle movement within the vicinity of the weirs (upstream and downstream) – Use of PIT tag recorders at select locations along the Fitzroy River to provide a greater range of data including: – Fitzroy Barrage in the vicinity of Alligator Creek – Areas between existing and proposed impoundment areas

Element	
	– Upstream of the Rookwood Weir impoundment on the Dawson and Mackenzie rivers – The potential use of hydrophones as an alternate to or in combination with PIT tags to improve the range of data captured – Real time tracking and monitoring of Fitzroy River turtle movements through the use of GPS tags (monitored via satellite) for selected areas and individuals (for example gestating females and adult males pre-breeding season). This would provide data specific to nesting behaviour and use of habitat within the Fitzroy River.
Monitoring	Not applicable during planning and design phase
Corrective action	Not applicable during planning and design phase
Responsible persons	• Design Manager is responsible for confirming design requirements and procedures outlined in the Fitzroy River turtle SMP are implemented.



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Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

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LEGEND

- Access Roads
- Channel
- Outlet works and fishway
- Proposed Control Room
- Proposed Spillway
- Environmental Outlet Works
- Turtle Ramp
- Eden Bann Weir Proposed Structure
- Property Boundary
- Construction Area
- Eden Bann Weir Stage 2 impoundment
- Eden Bann Weir Stage 3 impoundment

GHD CLIENTS|PEOPLE|PERFORMANCE

Gladstone Area Water Board

SunWater Making Water Work

Gladstone Area Water Board, SunWater
Lower Fitzroy River Infrastructure Project

Job Number 41-20736
Revision A
Date 06 Aug 2014

Eden Bann Weir general arrangement with turtle protection design features and turtle ramp

Figure 5-1

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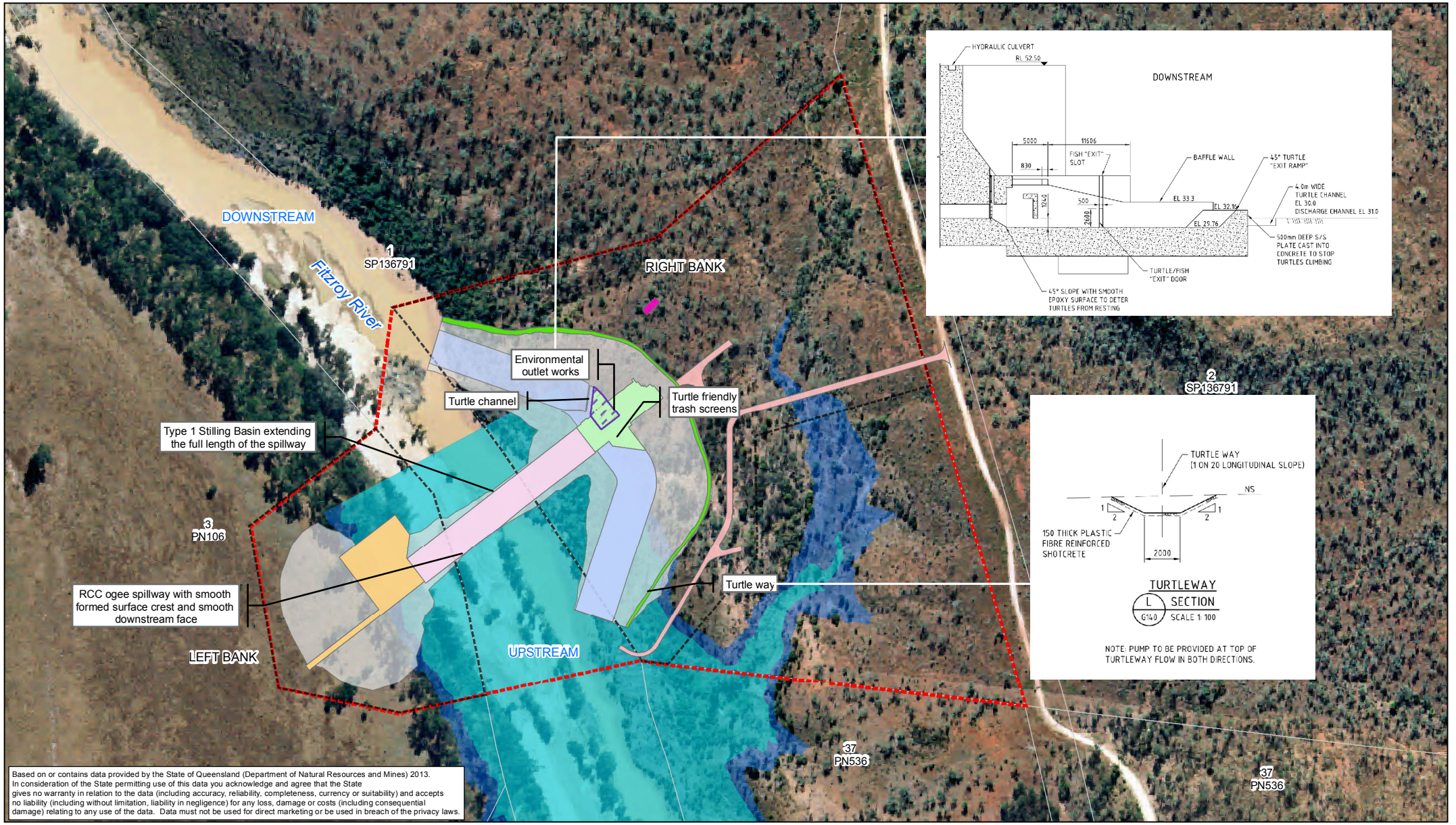

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0 50 100 150 200

Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA94)
Grid: Map Grid of Australia 1994, Zone 55

N

LEGEND

- Property Boundary
- Construction Area
- Proposed Property Acquisition Boundary
- Rookwood Weir proposed structure
- Abutement, Wide Rock filled mattress
- Access Roads
- Channel
- Outlet works and fishway
- Proposed Control Room
- Spillway
- Turtle Ramp
- Turtle Passage
- Rookwood Stage 1 impoundment
- Rookwood Stage 2 impoundment

GHD CLIENTS|PEOPLE|PERFORMANCE

Gladstone Area Water Board

SunWater Making Water Work

Gladstone Area Water Board, SunWater
Lower Fitzroy River Infrastructure Project

Job Number 41-20736
Revision A
Date 06 Aug 2014

Rookwood Weir general arrangement with turtle protection design features and turtle ramp

Figure 5-2

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5.3 Construction and commisioning management plan

Element	Description
Operational policy	• Avoid/minimise the loss of turtle aquatic and nesting habitat • Avoid/minimise the degradation of turtle aquatic and nesting habitat • Avoid/minimise turtle injury and mortality during construction • Maintain upstream and downstream movement of turtles.
Legislative compliance requirements	• EPBC Act • NC Act and Nature Conservation (Wildlife Management) Regulation 2006 (Qld) • Water Act • EP Act
Performance criteria	• All confirmed Fitzroy River turtle nesting habitat within the construction footprints identified, flagged in the field and recorded on construction plans • Successful relocation of all turtles and eggs identified during pre-clearance surveys and salvage activities • Protection mesh applied to all relocated nests in conjunction with the Feral Animal Control Program • Tagging and biological data collection (e.g. morphometric measurement) off all individual turtles relocated during pre-clearance surveys and salvage activities • Details of turtle and/or egg relocation included in environmental reporting • Degradation of turtle habitat (aquatic and nesting) outside of the construction footprints and river crossing construction areas minimised through the implementation of the Project Weed Management Plan, Feral Animal Control Program, Sediment and Erosion Control Plan and Hazardous Waste Management Plan • No turtle injuries or mortalities during construction and commissioning • Compliance with the WRP and ROP • Upstream and downstream movement of turtles maintained past Rookwood construction footprint and river crossing construction areas.
Implementation strategy	• The construction footprints will be kept to the minimum amount necessary to minimise risk of disturbance to turtles and habitat • The construction footprints will be clearly marked with construction tape to prevent disturbance and/or destruction of turtle habitat in adjacent areas • Prior to initial construction works, all river banks within the construction footprints will be surveyed by a suitably trained and qualified ecologist, during the peak nesting (September to November) and hatching (November to March) season. Pre-clearance surveys will occur during and immediately following rainfall events and will involve systematically searching banks for direct and indirect evidence of turtle nesting and hatchlings. Surveys will be repeated throughout the construction period for any new disturbance scheduled to occur during the nesting and hatching season • If Fitzroy River turtle nesting is confirmed to be present within the construction footprints and construction is not scheduled to commence until after the hatching season (November to March), then the area will be mapped and clearly marked in the field and on construction plans. Nest protection mesh will be secured over nests to provide predator protection

Element	Description
	• If construction works are scheduled to commence prior to the end of the hatching period (November to March) and nests are within the impact area, a suitably trained and qualified fauna spotter/catcher will relocate the eggs to a suitable area using techniques approved by DEHP. If a potential turtle nest is located, sand will be carefully excavated by hand taking extreme care to prevent eggs being cracked or punctured. Nest will be shaded from direct sunlight while eggs are exposed. Once uncovered, eggs will be carefully removed from the nest and placed into a transport container containing cool, moist river sand. Recently laid eggs will not be rotated as this may dislodge the embryo. Once secure in the transport container, eggs will be relocated to suitable habitat and buried approximately 20 cm below the surface in cool, moist sand at the top of the bank. Suitable relocation areas will be identified prior to construction and will consist of alluvial sand/loam banks with a relatively steep slope, low density of ground/understorey vegetation and shade cover. The fauna spotter/catcher will hold the appropriate permits for fauna relocation. Nest protection mesh will be secured over nests to provide predator protection. For nests that are unable to be relocated, DEHP will be contacted and the eggs transported for artificial incubation. Exclusion fencing will be erected along the nesting bank/s to prevent further nesting within the construction footprint or river crossing construction areas • The construction schedule of river crossing construction at Glenroy Crossing will be designed to avoid construction works that may impact on turtle habitat during the peak turtle nesting and hatching season (September to March) • Prior to any initial or new disturbance to aquatic habitat within the construction footprints, all impact areas will be inspected by a suitably trained and qualified fauna/spotter for the presence of the Fitzroy River turtle. Pre-clearance surveys for the Fitzroy River turtle will be undertaken immediately prior to disturbance works and will include survey techniques suitable for the species (i.e. seine netting, dip netting, snorkelling, muddling, spotlighting). If the Fitzroy River turtle is located, the species will be captured and relocated. Suitable relocation areas include permanent pools with associated riffle-run habitats. Relevant measures will be implemented to exclude turtle access to active constructions areas (e.g. erection of exclusion fencing/netting, bund walls) • All turtles captured during pre-construction surveys will be tagged with passive integrated transponder (PIT) tags, carapace notching and numbered monel metal foot tags. Morphometric measurements, age and sexual maturity, and evidence of injury and disease will also be recorded. All personnel involved in tagging and biological data collection activities will be suitably qualified, trained and hold the appropriate permits • A fauna spotter/catcher will be located on site during all works that have the potential to cause injury or mortality to turtles located in the area. The fauna spotter/catcher will identify, capture and relocate turtles and/or turtle nests as required to avoid impact • All habitat remaining within the construction footprints and river crossing construction areas, from which turtles are not excluded, will be inspected daily for the presence of the Fitzroy River turtle or its nests (during nesting season). Inspections will include a visual assessment of sand banks for turtle tracks or diggings • If injury occurs, turtles will be immediately removed and taken to a qualified veterinary or wildlife carer for treatment. Suitable veterinarians and wildlife carers in Rockhampton will be identified and commercial arrangements established to guarantee the financial costs of treatment and rehabilitation

Element	Description
	• All construction personnel will be informed of environmental responsibility with respect to the Fitzroy River turtle. Site inductions will include information on the identification of the Fitzroy River turtle, location of any confirmed habitat areas within or adjacent to the construction footprint and relevant management actions detailed in the Fitzroy River turtle SMP • Clearing of riparian vegetation within the impoundments will be prevented prior to inundation and large woody debris will be retained to provide in-stream habitat following inundation • Night lighting will be minimised where practicable. No lighting shall be placed in the vicinity of a confirmed nesting habitat adjacent to the construction footprints and river crossing construction areas. Any lighting installed will be designed and mounted so that no spill over light occurs within these habitat areas (such as directional lighting with protective guards) • Acquisition of construction resource materials will not occur in important habitat areas or from historical, confirmed or high potential turtle nesting habitat • A Weed Management Plan will be developed and implemented and will include the following control techniques specific to the protection of Fitzroy River turtle habitat: – Existing aquatic weeds within the construction footprints and river crossing construction areas will be removed prior to construction activities – Vehicles, plant and equipment will be cleaned prior to entering site to prevent the introduction of weeds to potential nesting areas – Key personnel on site will be capable of identifying terrestrial and aquatic weed species and preventing their spread and translocation. During an initial site inspection, weeds will be identified and flagged and recorded in the site register. Weeds will be treated to prevent spread – Introduced fish species captured during turtle pre-clearance surveys and salvage activities will be euthanized • A Feral Animal Control Program will be developed and implemented by construction personal or in collaboration with local council, community groups and landholders. The Feral Animal Control Program will be developed in accordance with approved conservation advice for the species and approved threat abatement plans for feral cats (DEWHA 2008a), European red fox (DEWHA 2008b) and feral pigs (DEH 2005). • Construction will primarily be undertaken over two consecutive dry seasons and cofferdams constructed to protect works and secure the abutments with the river remaining in its natural course • A flow diversion strategy will maintain flows at the Rookwood Weir site and provide safe turtle movement during construction phase flow events. The existing fish lock at Eden Bann Weir will remain in operation during construction. Flows will be maintained within the natural river channel at river crossing construction areas • Environmental flows downstream of the construction footprints will be maintained in accordance with the WRP and ROP

Element	Description
	• A Drainage, Erosion and Sediment Control Plan will be developed in accordance with the Project EMP and implemented. Specific management actions include: – Where practicable, schedule significant ground disturbing activities to take place during drier periods reducing the potential for erosion and sediment laden runoff entering the watercourse – Install diversions and erosion controls such as sediment basins to direct clean water away from construction areas and allow site affected water to settle prior to re-entering the river. • A Water Quality Management Plan will be developed and implemented in accordance with the Project construction EMP. Water quality parameters particularly important for the Fitzroy River turtle, i.e. turbidity, temperature, oxygen levels, toxic chemicals, will be monitored as part of the Project Water Quality Monitoring Program. The Project Water Quality Monitoring Program will include pre, during and post construction monitoring in accordance with the Australian Guidelines for Water Quality Monitoring and Reporting (Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) 2000) • A Waste and Hazardous Materials Management Plan will be developed and implemented. Specific management actions include: – Storage and use of potentially contaminating and polluting materials such as hydrocarbons, service and refuelling areas will be restricted to defined and protected (bunded) areas – Storage and handling of contaminants will comply with relevant guidelines and Australian standards. • The turtle protection design features of the weirs will be constructed in accordance with detailed design • Turtle ramps will be constructed at the weirs in accordance with detailed design • The turtle movement study commenced during the detailed design phase will continue through construction and commissioning • River crossing infrastructure will be constructed in accordance with detailed design
Monitoring	• Aquatic habitats immediately upstream and downstream of the construction footprints and river crossing construction areas will be monitored for signs of degradation as a result of the construction phase activities and turtles relocated if conditions deteriorate to threshold levels (to be confirmed) in isolated pools • The construction footprints and river crossing construction areas will be monitored in accordance with the Project Weed Management Plan, Feral Animal Control Plan, Sediment and Erosion Control Plan, Water Management Program and Hazardous Waste Management Plan • Fitzroy River turtle SMP compliance audits will be undertaken by an independent/external auditor • Prior to the completion of construction, a baseline survey of Fitzroy River turtle populations within the impoundment and immediately downstream (within 5 km) will be undertaken. Turtles will be tagged with PIT tags, carapace notching and numbered monel metal foot tags. Parameters recorded will include: – Morphometric measurements – Age and sexual maturity

Element	Description
	– Estimates of annual nesting and recruitment – Evidence of injury, mortality and disease – Known or likely nesting areas, including microhabitats – Estimates of predation and other losses of eggs at nesting sites.
Reporting	• Monthly environmental summary reports will be produced for the duration of the works. Copies of the reports shall be held on site and will be available for regulatory agency inspection, on request. The report shall include, but is not limited to the following: – Record of inspections – A list of any performance criteria that have not been met, the corrective action taken and a description of the magnitude of any possible environmental impact – Results of pre-constructions surveys, turtle/egg relocation and salvage activities – Results of water quality monitoring – Details of any turtle injuries or mortalities. • In the event an incident or exceedance of a condition goal or requirement is identified, an interim report will be completed within two days of being identified and DEHP notified. The report will include details of the incident, initial response and corrective action taken. A full report will be completed within 14 days of an incident or exceedance of a condition, goal or requirement being identified, which will provide details of the incident, response, corrective action, responsibility and timing. All reporting will be submitted to DEHP and will be assessed during compliance auditing • A construction phase compliance report will be completed annually for the duration of the construction phase. The compliance report will be prepared by an independent and appropriately qualified person and submitted to DEHP. The report must include the following: – Compliance with the Fitzroy River turtle SMP and details of any non-compliances – Compliance with the Proponent's commitments/conditions relating to the Fitzroy River turtle and details of any non-compliances – Response to incidents of non-conformance, including corrective actions, revised construction practices, responsibility and timing – Reporting of all non-compliances related to the Fitzroy River turtle and corrective actions to DEHP. – All other matters pertaining to environmental performance during construction
Corrective action	• A procedure will be established, implemented and maintained for dealing with actual and potential non-conformances and for taking corrective and preventive actions. The procedure shall define requirements for: – Identifying and correcting non-conformance and taking action to mitigate their environmental impacts – Investigating non-conformances, determining their cause and taking actions in order to avoid their reoccurrence – Consulting with DEHP for developing corrective actions and adaptive management actions – Recording the results of corrective and preventative action taken – Updating necessary documentation.

Element	Description
Responsible parties	• Construction Manager is responsible for: – Implementation of the construction and commissioning management actions in the Fitzroy River turtle SMP and providing adequate resources and training to allow for effective implementation – Compliance with all legal requirements including obtaining all required licences and approvals prior to the commencement of work and compliance with all conditions of these approvals • Environmental Manager is responsible for: – Providing guidance, support and advice regarding the Fitzroy River turtle SMP, environmental legislation and management – Assisting in obtaining any licences and permits required to undertake construction activities – Advising all staff and sub-contractors of their environmental obligations and providing guidance and advice with regard to turtle management requirements – Implementing, maintaining and monitoring all management actions in the Fitzroy River turtle construction and commissioning management plan – Monitoring , managing and reporting non-compliance procedures and corrective actions where necessary – Completing monthly summary environmental reports and incident reports – Undertaking routine environmental monitoring – Engaging an independent and appropriately qualified person to undertake the construction phase compliance report.

5.4 Operation management plan

Element	Description
Operational policy	• Avoid/minimise the loss of turtle habitat (aquatic and nesting) • Avoid/minimise the degradation of turtle habitat (aquatic and nesting) • Avoid/minimise turtle injury and mortality during operation • Maintain upstream and downstream turtle movement and prevent the fragmentation of the turtle population.
Legislative compliance requirements	• EPBC Act • NC Act and Nature Conservation (Wildlife Management) Regulation 2006 (Qld) • Water Act • EP Act
Performance criteria	• Upstream and downstream movement of turtles past the weirs and river crossing infrastructure • Re-establishment of aquatic and nesting habitat within the impoundment • Compliance with WRP and ROP • Weir operation minimises risk of turtle injury and mortality.
Implementation strategy	• The weir operating strategy will avoid/minimise risk of turtle injury and mortality. Specific operational actions will include: – Controlling the flow of water through release values to provide gradual increments in water release volume – Operate planned releases at times when turtles are more likely to be away from weir infrastructure, if practical, noting water supply constraints, dam safety, and operation safety may override this action – Ensure flexibility regarding spillway gate operations in detailed design to ensure that tailwater in the stilling basin can be facilitated prior to full operation of the spillway • The operability of the turtle ramp will be maintained through: – Undertaking regular inspections, cleaning and maintenance including following spill events – Inspect and maintain the attraction flow pump – Inspect and maintain the plastic fibre reinforced shotcrete on the turtle • Re-establishment of turtle aquatic and nesting habitat within the impoundment will be encouraged through the following actions: – Avoiding rapid drawdowns of the storage area and controlling water levels to allow for the stabilisation of aquatic and nesting habitat around the margins of the impoundment – Rehabilitating and restoring areas impacted by scouring, erosion and slumping – Promoting the natural regeneration of trees and shrubs – Controlling introduced weeds and feral animals in accordance with the Project Weed Management Plan and Feral Animal Control Program • Subject to compliance with the WRP and ROP, water release volumes and timing will be controlled to minimise the inundation of turtle nests downstream of the weir during nesting season

Element	Description
	• Recreational activities within the impoundment will not be encouraged or facilitated • A Weed Management Plan will be developed and implemented for the Project.
	• A Feral Animal Control Program will be developed and implemented for the Project. The Feral Animal Control Program will be developed in accordance with approved conservation advice for the species and approved threat abatement plans for feral cats (DEWHA 2008a), European red fox (DEWHA 2008b) and feral pigs (DoE 2005). • A Drainage, Erosion and Sediment Control Plan will be developed and implemented. Specific management actions include: – Stabilise existing bank slopes downstream of the weirs where appropriate using rip rap and other means as necessary – Control releases through the outlet works into defined (main) river channel. • An operations Water Quality Management Plan will be developed and implemented in accordance with the Project EMP. Specific management actions will include: – Using selective withdrawal outlets to select water of most appropriate quality for downstream release – Manipulating flows to prevent the build-up of blue-green algae or to disperse blooms • A Waste and Hazardous Materials Management Plan will be developed and implemented
Monitoring	• An operational phase Turtle Monitoring Program will be developed and implemented in consultation with DEHP. The monitoring program will be undertaken for a period of five years and will include areas upstream of the inundation area, within the impoundment and downstream of the weirs. The monitoring program will include targeted surveys (day and night sampling) during the turtle nesting (September to November) and hatching (November to March) seasons, as well as event based sampling • The turtle movement study commenced during the detailed design phase will continue through the five year Turtle Monitoring Program period (as a minimum) to evaluate the performance of the turtle ramps at each weir. • The Project footprints will be monitored regularly in accordance with the Project Weed Management Plan, Feral Animal Control Plan, Sediment and Erosion Control Plan, Water Management Program and Hazardous Waste Management Plan • Compliance audits will be undertaken by an independent/external auditor
Reporting	• In the event an incident or exceedance of a condition goal or requirement is identified, an interim report will be completed within two days of being identified and DEHP notified. The report will include details of the incident, initial response and corrective action taken. A full report will be completed within 14 days of an incident or exceedance of a condition, goal or requirement being identified, which will provide details of the incident, response, corrective action, responsibility and timing. All reporting will be submitted to DEHP and will be assessed during compliance auditing

Element	Description
	• An operations phase compliance report will be completed annually for a total period of five years from construction completion. The compliance report will be prepared by an independent and appropriately qualified person and will be submitted to DEHP. The report will include the following: – Compliance with the Fitzroy River turtle SMP and details of any non-compliances – Compliance with the Proponent's commitments/conditions and details of any non-compliances – Response to incidents of non-conformance, including where necessary corrective actions, revised operations practices, responsibility and timing • Reporting requirement associated with annual turtle monitoring will be detailed in the Turtle Monitoring Program approved by DEHP and will include a requirement for publication of reporting.
Corrective action	• A procedure will be established, implemented and maintained for dealing with actual and potential non-conformities and for taking corrective and preventive actions. The procedure will define requirements for: – Identifying and correcting non-conformities and taking action to mitigate their environmental impacts – Investigating non-conformities, determining their cause and taking actions in order to avoid their reoccurrence – Consulting with DEHP for developing corrective actions and adaptive management actions – Recording non-conformities and the results of corrective and preventative actions taken – Ensuring that any necessary changes are made to environmental management system documentation to capture adaptive management improvements. • In the event that the turtle passage infrastructure proves ineffective (based on criteria and timeframes developed with and approved by DEHP through the turtle movement study) adaptive management actions will be implemented (for example alternative ramp surfaces, altered attraction flows or capture and transfer where Fitzroy River turtle (and other turtles) are found to be aggregating downstream of the weirs).
Responsible parties	• The Operator of each weir is responsible for: – Implementation of the operational management actions in the Fitzroy River turtle SMP and providing adequate resources and training to allow for effective implementation – Engaging an independent and appropriately qualified person to completing all compliance, incidence and/or exceedance reporting – Implementing health, safety and environment management standards – Advising all personnel of their responsibilities and authorities relating to the Fitzroy River turtle SMP and turtle operation management plan – Identifying, clearly defining, documenting, and maintaining the responsibility and authority of all personnel, as they relate to environmental issues – Providing sufficient human, material and financial resources, including technical resources and support, for the effective implementation of the Fitzroy River turtle SMP and turtle operation management plan for which they are responsible – Demonstrating visible and pro-active commitment to the Fitzroy River turtle conservation and protection through completing actions identified in this SMP.

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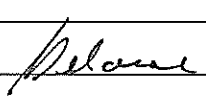
3	C Mills	G Squires		L Delaere		05/06/15

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