22. Offsets

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22.1 Introduction

22.1.1 Overview

This chapter outlines the offset legislative requirements and implementation options for the Lower Fitzroy River Infrastructure Project (Project). The assessment addresses Part B, Section 5.44 – 5.45 of the terms of reference (ToR). A table cross-referencing the ToR requirements is provided in Appendix B. The purpose of this chapter is to summarise Project offset requirements under the Queensland Government's environmental offsets framework and proposed methods of offset delivery. Environmental values requiring offsets are identified in Chapter 6 Flora, Chapter 7 Aquatic ecology and Chapter 8 Terrestrial fauna.

22.1.2 Regulatory framework

22.1.2.1 Overview

Where the Project will have unavoidable impacts on certain environmental values, offsets are required under legislation administered by the Australian Government and the Queensland Government. On 1 July 2014, a new environmental offsets framework was introduced in Queensland replacing former offset policies. State offset requirements of the Project have been assessed with reference to this new framework which includes the following:

- *Environmental Offsets Act 2014* (Qld) (EO Act)
- Environmental Offsets Regulation 2014 (EO Regulation)
- Queensland Environmental Offsets Policy Version 1.0.

Offset requirements under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) are addressed in Volume 2, Chapter 14 Offsets.

It is noted that the EO Act does not affect the functions or powers of the Coordinator-General under the *State Development Public Works and Organisation Act 1971* (Qld) (SDPWO Act). As such, the Coordinator-General is not compelled to comply with the EO Act during decision making, but may refer to the environmental offsets policy under the EO Act in imposing conditions requiring offsets (Chapter 3 Legislation and project approvals).

22.1.2.2 Environmental Offsets Act 2014

The key purpose of the EO Act is to counterbalance the significant residual impacts of particular activities on prescribed environmental matters through the use of environmental offsets. This is to be achieved primarily by:

- Establishing a framework for environmental offsets
- Recognising the level of protection given to prescribed environmental matters under other legislation
- Providing for national, State and local matters of environmental significance to be prescribed environmental matters for the purpose of this EO Act
- Coordinating the implementation of the framework in conjunction with other legislation.

Under the EO Act, an administering agency may impose an offset condition on an authority if a prescribed activity will, or is likely to, have a significant residual impact on a prescribed environmental matter and all reasonable on-site mitigation measures for the prescribed activity have been, or will be, undertaken.

It is noted that under section 15 of the EO Act the State cannot impose an offset condition in relation to a prescribed activity, if a Commonwealth decision has already been made in relation to the same, or substantially the same activity, prescribed environmental matter and area of impact. As such, offsets imposed as a condition as part of the Commonwealth approval will be taken to be offsets under the State approval. Having regard to this the offsets proposal presented in this chapter has been developed to address Commonwealth and State matters.

Under section 8 of the EO Act, a significant residual impact is generally defined as an adverse impact, whether direct or indirect, of a prescribed activity on all or part of a prescribed environmental matter that remains, or is likely to remain (temporarily or permanently) despite on-site mitigation measures for the prescribed activity and is, or is likely to be, significant.

Under section 9 of the EO Act, a prescribed activity is an activity the subject of an authority under another Act for which an offset condition may be imposed and that is prescribed under a regulation. Prescribed activities relevant to the Project are detailed in Section 22.2.2.

A prescribed environmental matter is any of the following:

- A matter of national environmental significance as defined under the EPBC Act
- A matter of State environmental significance (MSES) as identified in the EO Regulation
- A matter of local environmental significance as identified by a local planning instrument.

Prescribed environmental matters relevant to the Project are detailed in Section 22.2.3.

A proponent may elect to deliver an offset under the EO Act by three methods:

- Proponent-driven offset
- Financial settlement offset
- Combination of proponent-driven and financial settlement offsets.

Proponent-driven offsets are undertaken directly, or indirectly, by the authority holder while financial settlement offsets involve a payment from the authority holder to the administering authority. If the elected method is a proponent-driven offset, the proponent must also supply an offset delivery plan to the administering authority. If the elected method is a financial settlement offset, the administering authority will calculate an appropriate payment. On receipt of a notice of election, the administering authority will consider the election with regard to any offset delivery plan and the environmental offsets policy. The offset proposal described in section 22.3 for the Project is based on a combination of proponent driven offsets and financial settlement offsets.

22.1.2.3 Environmental Offsets Regulation 2014

The EO Regulation provides details of the prescribed activities regulated under existing legislation and prescribed environmental matters to which the EO Act applies. Section 22.2.2 and Section 22.2.3, respectively provide detail on activities and matters identified in relation to the Project.

Prescribed activities under s9 of the EO Act are listed under Schedule 1 of the EO Regulation and include:

- A resource activity
- A prescribed environmentally relevant activity (ERA)
- The carrying out of works in a marine park

- An activity conducted under an authority under the *Nature Conservation Act 1992* (Qld), s34, s35, s38, s42AD or s42AE in a protected area
- Taking a protected plant in an area outside a protected area
- Development for which an environmental offset may be required under the following modules of the State development assessment provisions:
  - (a) module 4 (environmentally relevant activities)
  - (b) module 5 (fisheries resources)
  - (c) module 8 (native vegetation clearing)
  - (d) module 10 (coastal protection)
  - (e) module 11 (wetland protection and wild river areas)
- Development for which an environmental offset may be required under any of the following:
  - (a) a local planning instrument
  - (b) a State planning regulatory provision within the meaning of the *Sustainable Planning Act 2009* (Qld)
  - (c) the State Planning Policy 2013, Part E: Interim development assessment requirements

Prescribed environmental matters of State environmental significance are described in Schedule 2 of the EO Regulation and include:

- Regulated vegetation
- Connectivity areas
- Wetlands and watercourses
- High preservation areas of wild river areas
- Protected wildlife habitat
- Protected areas
- Highly protected zones of State marine parks
- Fish habitat areas
- Waterway providing for fish passage
- Marine plants
- Legally secured offset areas.

22.1.2.4 Queensland Environmental Offsets Policy

The Queensland Environmental Offsets Policy (the policy) provides a single, streamlined, whole-of-government policy for environmental related offsets in Queensland. The purpose of the policy is to provide a decision-support tool to enable consistent assessment by administering agencies of offset proposals provided by authority holders to satisfy offset conditions.

The policy replaces the following offset policies:

- Queensland Government Environmental Offsets Policy (2008)
- Marine Fish Habitat Offsets Policy (version FHMOP005.2)
- Policy for Vegetation Management Offsets (2011)

- Queensland Biodiversity Offset Policy (2011)
- Offsets for Net Gain in Koala Habitat in South East Queensland Policy (2010).

Under section 14 of the EO Act, offsets can only be required if residual impacts constitute a significant residual impact as defined under section 8 of the EO Act. The Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE 2013) and the Queensland Environmental Offsets Policy Significant Residual Impact Guidelines (DEHP 2014) have been adopted for the assessment of the significance of residual impacts of the Project on MSES, as applicable.

Under the policy, an environmental offset must meet the following seven offset principles:

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

22.1.3 Approach and methodology

The approach to developing the offset proposal for the Project consisted of the following tasks:

- Review and interpretation of current State offsets legislation and policies
- Quantification of offset requirements
  - Identification of prescribed activities and prescribed environmental matters
  - Assessment of residual impact from the application of mitigation and management measures. The significance of residual impacts has been determined based on the Commonwealth and State significant impact guidelines as available and applicable.
- Development of offset proposal
  - Calculation of impact and offset requirement utilising the Commonwealth Offset Assessment Guide. The proposed proponent driven offsets have been developed to meet the offset requirements of the EPBC Act on the basis that a condition for an offset imposed under that authority will satisfy the requirements for offsets under the EO Act
  - Preparation of offset management plans (or frameworks as applicable)
  - Identification of opportunities for offset staging.

22.2 Project offset requirements

22.2.1 Overview

An offset condition may only be imposed on an authority (a licence, permit, approval or agreement under a Queensland Act) for a prescribed activity impacting upon a prescribed environmental matter. As such, where an authority is not triggered, an offset is not required. If that activity is one of those in EO Act Schedule 1, and it will have a significant residual impact on a prescribed environmental matter in the EO Act Schedule 2, the EO Act provides that an offset is required.

The following section identifies those prescribed activities for which an authority is required and the relevant prescribed environmental matters in relation to the Project.

22.2.2 Prescribed activities

Schedule 1 of the EO Regulation details the prescribed activities for which an offset condition may be applied. Prescribed activities relevant to the Project include:

- Environmentally relevant activities (Clause 2)
  - ERA 16: Extractive and screening activities (subject to separate environmental assessment and approval (Chapter 2 Project description)
  - ERA 8: Chemical storage (diesel, etc.)
  - ERA 47: Timber milling and wood chipping
- Development for which an offset may be required under a module of the State development assessment provisions (SDAP) (Clause 6), specifically module 5 (fisheries resources)
- Clause 7 development for which an offset may be required under the State Planning Policy 2013, Part E (Clause 7): Interim development assessment requirements for a material change of use application assessable under the Livingstone Planning Scheme 2005.

22.2.3 Prescribed environmental matters

Schedule 2 of the EO Regulation details the prescribed environmental matters for which an offset may be required. Prescribed matters relevant to the Project include:

- Regulated vegetation being remnant vegetation (Clause 2)
- Connectivity areas (Clause 3) in that the regional ecosystem includes riparian vegetation necessary for the ecosystem functioning
- Wetland and watercourses (Clause 4) in so far as the Fitzroy River is a watercourse in high ecological value waters as defined in the Environment Protection (Water) Policy 2009
- Protected wildlife habitat (Clause 6) as the Project areas shown as high risk on the flora survey trigger map; and habitat for the endangered Fitzroy River turtle (*Rheodytes leukops*)
- Clause 10 water providing for fish passage.

22.2.3.1 Regulated vegetation

The Project area includes regulated vegetation as defined in Schedule 2 of the EO Regulation, in so far as endangered and of concern prescribed regional ecosystems are present and the prescribed regional ecosystem is also adjacent to a relevant watercourse, being the Fitzroy River (Chapter 6 Flora).

As described in Chapter 3 Legislation and project approvals, the *Vegetation Management 1999* (Qld) (VM Act) in conjunction with the *Sustainable Planning Act 2010* (Qld) (SP Act) and the Sustainable Planning Regulation 2010 (SP Regulation) regulates operational work that is the clearing of native vegetation. However the Project is deemed to be 'other community infrastructure', specifically 'water cycle management infrastructure' under the SP Regulation and is considered not assessable development (Schedule 3, Part 1, Table 4, Item 1). The clearing of native vegetation is therefore exempt development and will not require approval or assessment against the SDAP.

As the proposed activity is exempt development for which an authority is not required, a condition requiring an environmental offset cannot be applied. Offsets are not proposed in this regard.

Offsets for endangered Brigalow (*Acacia harpophylla* dominant and co-dominant) threatened ecological community are proposed under the EPBC Act Environmental Offset Policy as described in Volume 2, Chapter 14 Offsets.

22.2.3.2 Connectivity areas

The Project area includes connectivity areas being prescribed regional ecosystems and land that is required for ecosystem functioning. Within the impoundments, the inundation of riparian vegetation as a result of the Project has the potential to disrupt connectivity between habitats within the Project footprint (and the wider study area). This is likely to be most prevalent in the lower reaches of the impoundment, where the raised water level is predicted to inundate riparian bankside vegetation (as opposed to in-stream vegetation only in the upper reaches of the impoundment). This reduction in connectivity along the riparian zone is likely to be most notable where only a thin strip of fringing riparian vegetation, abutted by cleared agricultural land, occurs.

Given their connectivity and resource values, these areas have a high ecological value as habitat and regional corridors for wildlife movement. Although this lowland vegetation has been subjected to significant edge effects and impacts from cattle, it plays an important ecological role, providing both habitat and a level of connectivity between habitat remnants. Connectivity and biodiversity values in the upper reaches of the proposed impoundment are limited to fragmented patches of riparian fringe vegetation largely unconnected to other remnant habitat. Native vegetation within the surrounding landscape is largely not directly connected to native vegetation impacted by the Project. It is not proposed to clear the impoundment area and it is expected that vegetation will re-establish itself at the new impoundment level as is evident from the existing Eden Bann Weir impoundment.

The widening of the river, and the reduced occurrence of shallow water and seasonally dry riverine habitats will also reduce the ability of terrestrial fauna (namely mammals and reptiles) to move back and forth across the river. However, the Fitzroy, Mackenzie and Dawson rivers are dynamic systems with flows either in flood or receded to isolated pools seasonally. While impoundment will widen the river (particularly directly behind the weir wall) drawdown will facilitate reduced flows upstream and creation of isolated pools as is displayed in the natural system. Movement of fauna between banks is thus maintained during these periods. More mobile species may opportunistically utilise weir and/or bridge infrastructure.

While the impoundments have the potential to disrupt terrestrial fauna movement corridors, bioregional corridors of local, regional and state significance, will still prevail directly adjacent to the high water level of the impoundment. This is particularly notable immediately upstream of Eden Bann Weir on the northern bank and near Princhester and Marlborough creeks. It is also

notable in the upper reaches of the Rookwood Weir impoundment, namely along the northern bank of the upper Fitzroy River, the eastern bank of the lower Mackenzie River, and the lower Dawson River. As the impoundment is more extensive in the lower reaches, the persistence of these mapped corridors is important (Chapter 8 Terrestrial fauna).

Based on the assessment of potential impacts as described in Chapter 6 Flora and Chapter 8 Terrestrial fauna, it is not considered that the prescribed activities associated with the Project will result in a significant residual impact to connectivity areas. As such no offsets for connectivity areas are proposed.

22.2.3.3 Wetlands and watercourses

As described in Chapter 7 Aquatic ecology, wetland areas in proximity to the Project will not be directly impacted and no significant residual impacts are predicted.

The Fitzroy River is included in Schedule 2 of the Environmental Protection (Water) Policy 2009 as high ecological value waters and is therefore a prescribed environmental matter.

Project areas upstream of Eden Bann Weir and Rookwood Weir will be inundated as a result of the Project. The alteration of natural riverine habitats within the Eden Bann Weir Project footprint and Rookwood Weir Project footprint will reduce the heterogeneity of the river system and therefore the diversity of habitats available to aquatic fauna. Assessment of impacts on aquatic species such as freshwater turtles, estuarine crocodile (*Crocodylus porosus*), fish and macroinvertebrates is described in Chapter 7 Aquatic ecology. Together with water quality considerations and appropriate mitigation and management actions to be implemented as part of the project development, significant residual impacts are not predicted and thus offsets are not proposed in this regard. Impacts on the Fitzroy River turtle are addressed separately.

Significant residual impacts on watercourse areas downstream of the weirs are not predicted. Operation of Eden Bann Weir and Rookwood Weir allows for environmental releases in addition to allocation releases (Chapter 9 Surface water resources). Design features (such as differential offtakes) allow for maintenance of water quality (Chapter 11 Water quality).

Weirs by nature are in-river structures that are designed to be overtopped. Unlike a dam, the whole of the structure is located within the bed and banks of a stream. In floods that result in water breaking the banks of a stream and flowing over the adjacent flood plain, a weir will be inundated, resulting in drowning of the weir. Modelling has shown that there will be no significant changes to flood flows as a result of the Project and offsets are not proposed in this regard.

It is not considered that a significant residual impact to the watercourse will occur as a result of the Project.

22.2.3.4 Protected wildlife habitat

Protected wildlife habitat is present within the Project area for the following vulnerable or special least concern species:

- Squatter pigeon (*Geophaps scripta scripta*)
- Powerful owl (*Ninox strenua*)
- Fitzroy River turtle
- Koala (*Phascolarctos cinereus*)
- Echidna (*Tachyglossus aculeatus*)

- Estuarine crocodile
- Brigalow scaly-foot (*Paradelma orientalis*)

Of these species, significant residual impacts are predicted for the Fitzroy River turtle.

Potential impacts to the remaining species are discussed in Chapter 6 Flora, Chapter 7 Aquatic ecology and Chapter 8 Terrestrial fauna. Based on assessment of potential impacts and mitigation measures, it is not considered that significant residual impacts will persist (in accordance with the Queensland Government Significant Residual Impact Guideline (DEHP 2014).

Fitzroy River turtle

The Fitzroy River turtle is listed as vulnerable under the EPBC Act and *Nature Conservation Act 1992* (Qld) (NC Act). The Fitzroy River turtle is endemic to the Fitzroy Basin catchment with the species' distribution extending from the Fitzroy Barrage to the upper reaches of the Dawson, Nogoa and Connors Rivers. The distribution of the Fitzroy River turtle encompasses the Project areas and the species is known to occur within both the Eden Bann Weir and Rookwood Weir Project footprints and in areas upstream and downstream. Important habitat in the form of historically significant type localities and mapped essential habitat is present and the footprints support isolated nesting in a number of areas. Due to the proportion of the species' habitat in which the Project is located and the significance of habitats within and downstream of the Project, the Project footprint is considered to support an important population of the Fitzroy River turtle. The largest known nesting aggregation for the species occurs downstream of Eden Bann Weir in the upper reaches of the Fitzroy Barrage impoundment.

The biggest threat to the survival of the Fitzroy River turtle is the lack of recruitment into the population. 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 (close to 100 per cent of clutches predated each season). The population 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).

Other threatening processes (DERM 2008) include: loss of habitat; alteration of natural flow regime; movement barriers; physical injury and mortality; and poor water quality.

Detailed information on the Fitzroy River turtle is provided in Chapter 7 Aquatic ecology and Appendix L Fitzroy River turtle (*Rheodytes leukops*) technical report. The Fitzroy River turtle species management program (SMP) (Appendix M) describes measures to be implemented to avoid, and if this is not possible, minimise the potential impacts of the Project on the species and provides a framework for the management of the species throughout the life of the Project. The SMP will be implemented together with the Project construction environmental management plan (EMP) and operational EMP (Chapter 23 Environmental management plan).

Unavoidable impacts are expected to remain in relation to operational activities. These residual impacts are considered significant in accordance with the Commonwealth Matters of National Environmental Significance: Significant Impact Guidelines 1.1 (DoE 2013) and offsets are proposed to be implemented consistent with the EPBC Act Environmental Offset Policy, Offset provisions in regard to the Fitzroy River turtle are presented in Section 22.3.2.

It is considered that offsets provided to satisfy the EBPC Act Environmental Offset Policy for the loss of nesting habitat will also satisfy the offset requirements of the Queensland Environmental

Offsets Policy (Section 22.3.2). A financial settlement offset is proposed for the Project's residual impacts to aquatic habitat as described in Section 22.3.3.

22.2.3.5 Waterway providing for fish passage

The Project involves the construction of waterway barrier works within the Fitzroy River. Tropical freshwater fish regularly move among spawning, feeding and refuge habitats (Lowe-McConnell 1987; Lucas and Baras 2001) and free movement of fish within the river system is important to maintain viable populations (Marsden and Power 2007). Obstacles to fish migration can impact native species in a number of ways including declines in abundance, species distribution truncation, localised extinction events and a reduction in species diversity (Marsden and Power 2007).

Chapter 7 Aquatic ecology provides a detailed assessment of fish passage associated with the Project. Maintaining upstream and downstream fish passage and minimising the potential risk of injury and mortality associated with the in-stream infrastructure have been key management objectives through the Project design phase. A detailed fishway design process has been undertaken in accordance with Queensland Design Process criteria. Proposed fish passage infrastructure at Eden Bann Weir comprises an upgraded fish lock on the left bank and a new fish lock located on the right bank for high and low reservoir levels. Fish passage infrastructure at Rookwood Weir includes a right bank fish lock. Fish lock arrangements will facilitate upstream and downstream movement at low and high reservoir levels, provide passage for most flows (in the order of 95 per cent of flows) and cater for small and large bodied fish. It is considered that mitigation and management will negate any potential for that significant residual impact and offsets are not proposed in this regard.

22.3 Offset proposal – Fitzroy River turtle

22.3.1 Overview

The assessment of offset requirements has identified the Fitzroy River turtle as a matter of State environmental significance requiring offsetting.

The offset proposal includes two elements:

- A proponent driven offset for impacts to nesting habitat through the management and protection of turtle nests to improve birth rates. The offset proposal for residual impacts to Fitzroy River turtle nests has been developed using the Offsets assessment guide that accompanies the EPBC Act Environmental Offsets Policy. The Offsets assessment guide utilises a balance sheet approach to estimate impacts and offsets. A direct offset proposal for the Fitzroy River turtle has been developed inclusive of impact and offset calculations, development of a proposed management plan and staging considerations. This offset satisfies the requirements under the EPBC Act and is described in detail in Volume 2 Chapter 14.
- A financial offset of aquatic habitat through financial compensation to satisfy requirements under the EO Act.

Under the EO Act, where an offset condition has been applied to an authority by the Commonwealth, a further condition for an offset cannot be applied by the State for the same activity or matter. Consequently, it is considered that offsets provided to satisfy the EBPC Act Environmental Offset Policy will also satisfy the offset requirements of the Queensland Environmental Offsets Policy. Accordingly, detailed offset proposals for residual impacts to Fitzroy River turtle nests are included in Volume 2, Chapter 14 Offsets. A summary is provided in Section 22.3.2.

22.3.2 Nesting habitat

22.3.2.1 Impact calculator

Direct residual impacts to Fitzroy River turtle nesting as a result of the Project will occur through the inundation of nesting habitat within the Project footprints (Figure 22-1).While the Project's residual impact is related to loss of turtle nesting habitat, protecting nests is considered more effective than protecting nesting habitat in improving birth rates and recruitment of hatchlings into the population.

The biggest threat to the survival of the Fitzroy River turtle is the lack of recruitment into the population. Current recruitment rates are not considered adequate to sustain the population of Fitzroy River turtles within the catchment (Limpus et al. 2007).

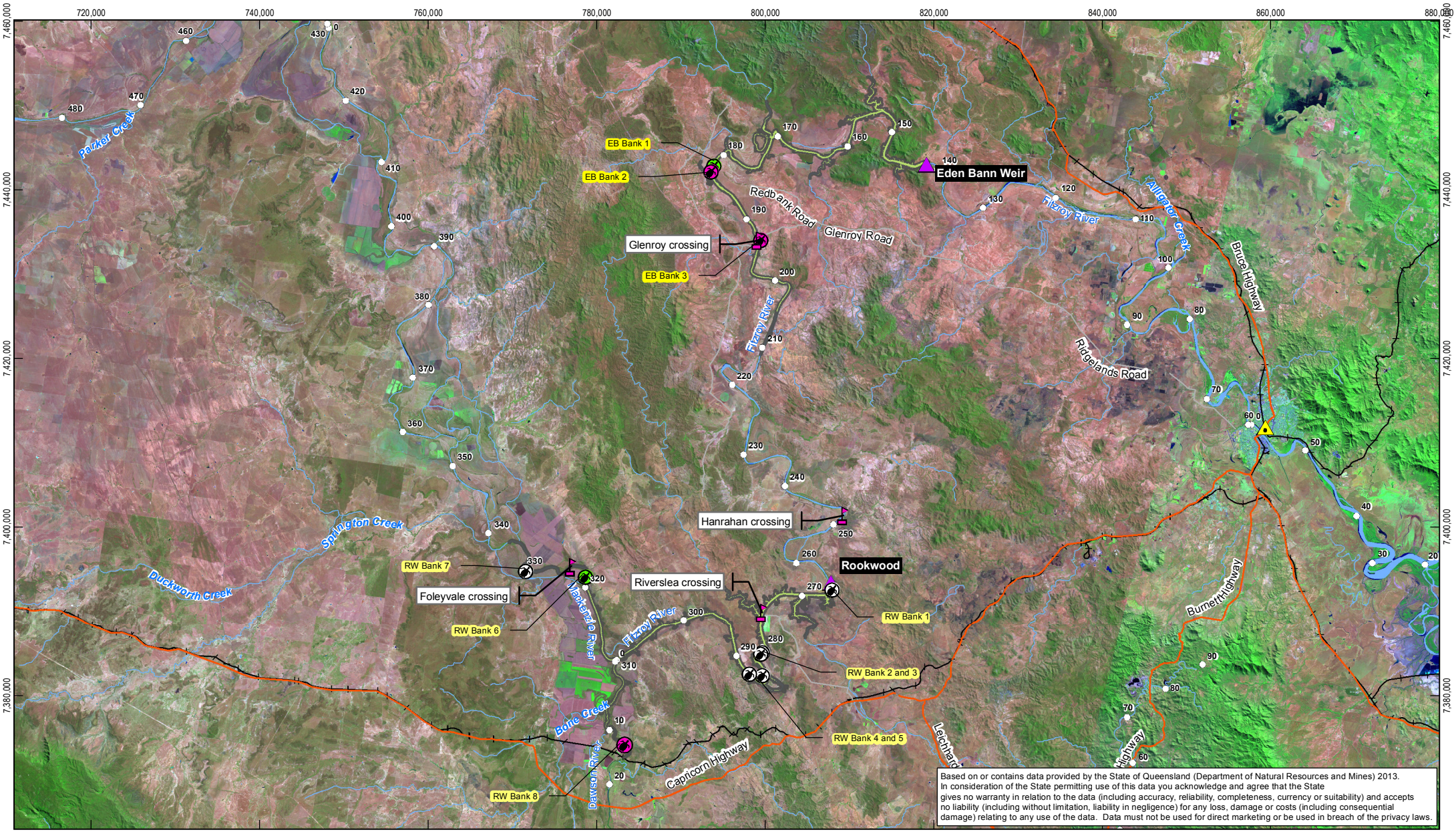
The direct Project impact to nests is via inundation which is expected to conservatively impact 80 per cent of nests within the inundation area. Not all nests would be inundated every year. Nest predation rates are extremely high with close to 100 per cent of clutches predated each season (Limpus et al. 2007; DERM 2008). However due to the existing extremely high predation rates the potential Project impact on birth rate is considered to be minimal. The protection and management of nests will improve nest success and thus birth rate and will target Project specific impacts as well as address the key processes currently threatening the survival of the species throughout the catchment. These actions will reduce nest predation, increase population recruitment and promote the recovery of the species.

22.3.2.2 Offset calculator

In order to offset the residual impact of the Project on Fitzroy River turtle nesting it is proposed that a nest protection program be implemented. Greening Australia currently implements a Fitzroy River Turtle Conservation Program through funding from Australia Pacific LNG and the Fitzroy Basin Association. It is proposed that funding will be provided by the Project to continue this program or to develop similar programs.

To protect natural nests the program would aim to:

- Identify and select priority nesting banks within the Fitzroy River catchment where there is an aggregation of the Fitzroy River turtle (e.g. Alligator Creek).
- Identify landowners willing to participate in the protection program and allow access to the river bank during nesting season



1:600,000 (at A4)

0 10 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
- River Crossing
- Highway
- Minor Road
- Waterway
- Railway
- Historical turtle nesting site
- Confirmed turtle nesting site
- High Potential Turtle Nesting Suitability
- 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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Gladstone Area Water Board

SunWater Making Water Work

Gladstone Area Water Board, SunWater
Lower Fitzroy River Infrastructure Project

Job Number 41-20736
Revision C
Date 04 Aug 2014

Location of historical, confirmed and high potential nesting habitat within the Project footprints

Figure 22-1

G:\41\20736\GIS\Projects\MXD\900_Baseline Terrestrial Fauna Report\4120736_915_Nesting_both_weir_Rev_A.mxd

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, Imagery/2005, Essential Habitat /2008. Created by: MS

- Field officers or volunteers would:
  - Monitor stream banks for signs of turtle nesting, especially after rainfall
  - Secure a 70-100 cm square plastic mesh cover with a 10 cm grid (to allow hatchlings to escape) with sand pegs
  - Mark nests with a numbered stake to allow hatching success to be monitored.
- Encourage landowners to use electric fences during the nesting season to minimise trampling by stock or more permanent fencing if preferred
- Manage terrestrial and aquatic weeds to prevent weeds from blocking access to suitable nesting habitat (Weed Management Plan).

A Feral Animal Control Program will also be developed and implemented for the Project in collaboration with local council, community groups and landholders. Specific control measures may include culling, baiting and trapping of pigs, foxes, wild dogs and feral cats.

Nest protection programs implemented at Alligator Creek by Greening Australia (assisted by the Fitzroy Basin Association, and under guidance from the Department of Environment and Heritage Protection (DEHP)) (Limpus et al. 2001) and in other river systems throughout Australia (Wedlock 2006; Connell 2011; Connell 2012; Stockfeld and Kleinert 2013), are shown to immediately improve turtle nesting success and recruitment of hatchlings within a single breeding season. It is therefore estimated that the time required for the proposed offset to achieve ecological benefits is one year.

22.3.2.3 Offset management plan

To achieve the offset outcomes, a Fitzroy River turtle nest offset management plan has been drafted and presented in Table 22-1. The proposed offset management plan details the management actions that will be implemented to specifically target the key threatening processes of high nest predation and low population recruitment. Management actions, based on current measures utilised by Greening Australia and DEHP will include predator control (Feral Animal Control Program), weed management (Weed Management Plan), and individual nest protection. These management actions are known to reduce nest predation rates and increase recruitment of hatchlings into the population as reported in Connell and Wedlock 2006; Connell 2011; Connell 2012. Current funding for nest protection for the Fitzroy River turtle is generally limited and inconsistent to support the continuity of programmes and therefore the proposed guaranteed secure funding for conservation programs will improve nesting success and ecological benefits.

Table 22-1 Fitzroy River turtle nests offset management plan

Element	Fitzroy River turtle
Operational policy	• Protection and management of Fitzroy River turtle nests
Legislative compliance requirements	• EPBC Act 1999 • EPBC Act Environmental Offset Policy • NC Act • EO Act • EO Regulation • Queensland Environmental Offset Policy.
Performance criteria	• Reduction in nest predation and increased recruitment of hatchlings into the population
Implementation strategy	• Priority turtle nest monitoring areas are to be identified, this will be based on access requirements, landowner agreement and suitability of site for nesting (e.g. existing aggregation) • A Feral Animal Control Program will be developed and implemented for the Project in collaboration with local council, community groups and landholders. Specific control measures may include culling, baiting and trapping of pigs, foxes, wild dogs and feral cats • A Weed Management Plan will be developed and implemented to enhance the quality of habitat within and adjacent to the Project area. Specific management measures will include regular monitoring, removal and control of terrestrial and aquatic weeds within and adjacent to the Fitzroy River. Monitoring and removal will be undertaken prior to the peak Fitzroy River turtle nesting season • The Feral Animal Control Program and Weed Management Plan will be implemented in accordance with the plans and strategies set out by Biosecurity Queensland (Department of Agricultural, Fisheries and Forestry). As such, identification and management of declared pests will be undertaken in accordance with the *Land Protection (Pest and Stock Route Management) Act 2002* (Qld) and relevant local government strategies and plans, including the Rockhampton Regional Council Pest Management Plan 2012-2016 and the Central Highlands Regional Council Pest Management Plan 2012 • Individual turtle nests laid within monitoring areas (to be determined) will be protected within 24 h of being laid. Nests laid by the Fitzroy River turtle will be identified and nesting characteristics recorded (e.g. date, location and depth of nest). Aluminium grid (1 m^2) will then be placed over each individual nests and secured with sand pegs. The grid size should be large enough to allow hatchlings to pass through it • The hatching success of individual nests protected will be recorded throughout the egg hatching season (November to March). Protected nests will be excavated to the top of the first egg to check for evidence of hatching. For those nests that have hatched, the number of eggs from which hatchlings have successfully emerged will be recorded and compared to the total number of eggs laid. Predated egg shell and evidence of predators (e.g. tracks and scats) will also be recorded. Nests that have not hatched at the time of survey will be covered over and re-assessed during subsequent monitoring.

Element	Fitzroy River turtle
Monitoring	• The identified monitoring areas will be monitored to describe the existing habitat conditions and level of nesting activity prior to the implementation of the offset management plan. Monitoring will be undertaken during the peak turtle nesting season (September to November) and hatching season (November to March). Individual monitoring events for nesting activity will follow periods of rainfall. Parameters recorded will include: bank characteristics (bank width, height, slope, substrate, vegetation), levels of disturbance, presence of weeds and pests, nesting activity (number and location of turtle nests or attempted nesting), nest characteristics (distance from waters' edge, depth, number of eggs, species), and nesting success (number of successful hatchings) • Following implementation of the offsets management plan, identified sites will be monitored regularly (indicative frequency of three times per week) during the peak Fitzroy River turtle nesting season (September to November) for the purposes of identifying and protecting individual nests. Nesting is triggered by rainfall and monitoring should occur during and/or immediately following each event • Throughout the egg hatching season (November to March), protected nests will be monitored regularly (indicative frequency of once per month) for the purposes of recorded hatching success and rates of nest predation • The Fitzroy River turtle population in the vicinity of the monitoring area will be monitored annually for a period of five years from the implementation of the offset management plan. Turtles will be tagged with passive integrated transponder (PIT) tags, carapace notching and numbered monel metal foot tags. Parameters recorded will include: – Morphometric measurements – Age and sexual maturity – Reproductive biology – Evidence of injury, mortality and disease. • The success of the offset management plan will be monitored to evaluate the suitability of the management actions and assess the requirement for adaptive management in light of new information and developments in technology. Monitoring tools may include the use of remote cameras to record nesting and predator activity.

22.3.2.4 Offset staging

The Project will be implemented by way of a flexible strategy to allow the rapid delivery of water to meet anticipated future water demands, when triggered. There is yet to be a decision on the order or composition in which the proposed developments will proceed. While the Project is expected to be staged with sequencing and timing dependent on a number of demand triggers, it is proposed that offsets in relation to the Fitzroy River turtle nests will be provided for in total when a first stage of development is triggered. In effect, offsets are therefore provided in advance of future development stages.

22.3.3 Aquatic habitat

22.3.3.1 Impact calculation

Aquatic habitat is directly impacted by the Project due to potential changes in water levels. Aquatic habitat types within the Project footprint included in the calculation of impacted aquatic habitat include pool, riffle, run habitats and creeks adjoining the main river. In the absence of suitable GIS data, aquatic habitat was manually digitised using satellite imagery (Digital Globe World View 2, July 2010) based on the discernible boundaries of water within the river channel (excluding rock and sand banks) between the upper limit of the existing and proposed Eden Bann Weir impoundment and within the proposed Rookwood Weir impoundment. While sand banks within the river channel are utilised by aquatic species, impacts on these habitats have been assessed separately (Section 22.3.2). The digitised data was then cross-checked against river bed level cross-section data at 81 locations. A detailed methodology for the calculation of aquatic habitat with the Project footprint is provided in Appendix L.

While the Fitzroy River turtle is often referred to as a riffle zone specialist, the species also inhabit pools, runs and creeks. However, deep water areas (> 5 m) of pools are largely uninhabitable to the turtle species due to reduced oxygen levels, limited light penetration and lower temperatures. Currently there is not enough information available on depth profiles to be able to exclude deep water habitat that would not be utilised by the Fitzroy River turtle. As such, the inclusion of pool habitat in the calculation of impacted Fitzroy River turtle aquatic habitat is considered conservative.

Approximately 282 ha of aquatic habitat occurs within the Eden Bann Weir Project footprint and approximately 660 ha of aquatic habitat occurs within the Rookwood Weir Project footprint. Table 22-2 provides the area of aquatic habitat impacted within each local government area, bioregion and subregion as required by the Queensland Government's financial offset calculator.

Table 22-2 Aquatic habitat impact area and offset area

Local government area	Bioregion	Subregion	Area impacted (ha)
Central Highlands Regional Council	Brigalow Belt	Isaac-Comet Downs	153.0
		Boomer Range	41.0
		Dawson River Downs	36.5
Rockhampton Regional Council	Brigalow Belt	Isaac-Comet Downs	72.8
		Boomer Range	134.9
		Marlborough Plains	76.4
		Mount Morgan Ranges	396.4
Woorabinda Aboriginal Shire Council	Brigalow Belt	Isaac-Comet Downs	24.3
Livingstone Shire Council	Brigalow Belt	Marlborough Plains	6.9
Total			942.2

22.3.3.2 Financial offset proposal

Offsetting of impacts to aquatic habitat is proposed through the application of a financial offset. Like for like offsets for aquatic habitat are not practicable and cannot be achieved for this Project due to the nature of the habitat being offset. As such it is considered that a financial contribution provided as an indirect offset is appropriate and it could be utilised for beneficial research or similar activities aimed at improving survival of the species.

The Queensland Government's financial settlement offset calculator will be used to determine the financial contribution required to offset the Project impacts on aquatic habitat at full development.

It is proposed that although aquatic habitat is being offset, the terrestrial calculator for Fitzroy River turtle has been utilised. The marine and aquatic calculator only applies to marine matters, fish habitat and fish passage, each of which does not require an offset with regard to the Project.

22.3.3.3 Offset staging

The Project will be implemented by way of a flexible strategy to allow the rapid delivery of water to meet anticipated future water demands, when triggered. There is yet to be a decision on the order or composition in which the proposed developments will proceed. Should the Project be developed in a staged manner the financial offset would also be staged to reflect the staged impacts.

22.4 Summary

The Project development will trigger a number of prescribed activities under Schedule 1 of the EO Regulation and will impact upon prescribed environmental matters as listed in Schedule 2 of the EO Regulation.

Based on the requirements of the EO Act and consistent with the Commonwealth and State significant impact guidelines, a significant residual impact has been identified for the Fitzroy River turtle as a prescribed environmental matter for which offsets have been proposed.

Whilst impact to a second matter, regulated vegetation, will occur, the prescribed activity is exempt and an authority is not required. As such a condition requiring an offset cannot be applied under the EO Act in this regard.

The proposed offsets for Fitzroy River turtle nesting habitat have been developed to meet the offset requirements of the EPBC Act on the basis that a condition for an offset imposed under that authority will satisfy the requirements for offsets under the EO Act.