Environmental Impact Statement Report under the *Environmental Protection Act 1994*

for the Baralaba North Continued Operations Project proposed by Cockatoo Coal Limited

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List of acronyms and abbreviations

ACARP – Australian Coal Association Research Program

AEP – annual exceedence probability

AHD – Australian height datum

ANZEC & ARMCANZ – Australian and New Zealand Environment Council and Agriculture and Resource Management Council of Australia and New Zealand

ARI – annual recurrence interval

AS – Australian standard

ATP – authority to prospect

BNCOP – Baralaba North Continued Operations Project

BoM – Bureau of Meteorology

BSCP – Baralaba South Coal Project

CAG – community advisory group

CFMEU – Construction, Forestry, Mining and Energy Union

CHPP – coal handling and processing plant

CHRC – Central Highlands Regional Council

CLR – contaminated land register

Cockatoo Coal – Cockatoo Coal Limited

$CO_{2\text{-}e}$ – carbon dioxide equivalent

DAFF – Department of Agriculture, Fisheries and Forestry

DATSIMA – Department of Aboriginal and Torres Strait Islander and Multicultural Affairs

dB(A) – A-weighted decibels

dB(L) – decibels measured linear with no weighting

DETE – Department of Education, Training and Employment

DOTE – Department of the Environment

DSA – Design storage allowance

DSDIP – Department of State Development, Infrastructure and Planning

DNRM – Department of Natural Resources and Mines

DTMR – Department of Transport and Main Roads

EA – environmental authority

EC – electrical conductivity

e.g. – for example

EHP – Department of Environment and Heritage Protection

EIS – environmental impact statement

EMR – environmental management register

EP Act – *Environmental Protection Act 1994*

EPBC Act – *Environment Protection and Biodiversity Conservation Act 1999*

EPC – exploration permit coal

EPP – exploration permit petroleum

ERA – environmentally relevant activity (as defined in Schedule 2 of the EP Act)

etc. – et cetera

ETL – electricity transmission line

FIFO – fly-in fly-out

GAB – Great Artesian Basin

GDEs – groundwater dependant ecosystems

g/m^2/month – grams per metre squared per month

ha – hectares

HES – high ecological significance

Hz – hertz

i.e. – that is

IESC – Independent Expert Scientific Committee

IQQM – integrated quality and quantity model

JFE Shoji – JFE Shoji Trade Corporation

JSBW – JS Baralaba Wonbindi Pty Ltd

kg – kilograms

km – kilometres

km/h – kilometres per hour

km^2 – kilometres squared

kV – kilovolt

L_{Aeq} – equivalent continuous noise level

LOR – limit of reporting

m – metres

MAW – mine affected water

mg/L – milligrams per litre

MIA – mining infrastructure area

ML – megalitres or mining lease

ML/day – megalitres per day

ML/y – megalitres per year

mm – millimetres

mm/s – millimetres per second

MNES – matters of national environmental significance (as defined in the EPBC Act)

MR Act – *Mineral Resources Act 1989*

MRL – mandatory reporting level

MSES – matters of State environmental significance

m/s – metres per second

m^3/s – metres cubed per second

Mt/y – million tonnes per year

NAF – non-acid forming

NC Act – *Nature Conservation Act 1994*

NEPM – national environment protection measure

NTU – nephelometric turbidity units

OPSIM – operational simulation model

PAA – priority agricultural area

PAF – potential acid forming

PAF–LC – potential acid forming – low capacity

PMF – probable maximum flood

$PM_{2.5}$ – particulate matter less than two point five micrometres in diameter

PM_{10} – particulate matter less than ten micrometres in diameter

proponent – Cockatoo Coal Limited

QR – Queensland Rail

REMP – Receiving environment monitoring program

RGTCT – RG Tanna Coal Terminal

RIA – road infrastructure agreement

RIDA – regional interests development approval

RMP – road-use management plan

ROM – run-of-mine

RPI Act – *Regional Planning Interests Act 2014*

SCL – strategic cropping land

SCL Act – *Strategic Cropping Land Act 2011* (repealed by the *Regional Planning Interests Act 2014*)

SDPWO Act – *State Development and Public Works Organisation Act 1971*

t – tonnes

TEC – threatened ecological community

TEM – transient electromagnetic survey

TI Act – *Transport Infrastructure Act 1994*

TOR – terms of reference

TSP – total suspended particulates

TSS – total suspended solids

US EPA – United States Environmental Protection Agency

VEIS – voluntary environmental impact statement

VWP – vibrating wire piezometers

WCZ – western cropping zone

WICET – Wiggins Island Coal Export Terminal

WMP – water management plan

WQO – water quality objective

$\mu g/m^3$ – micrograms per metre cubed

µS/cm – microSiemens per centimetre

1 Introduction

1.1 Statutory basis of this report

This report provides an evaluation of the environmental impact statement (EIS) process pursuant to Chapter 3 of the *Environmental Protection Act 1994* (EP Act) for the Baralaba North Continued Operations Project, proposed by Cockatoo Coal Limited (Cockatoo Coal). Cockatoo Coal is seeking approval to expand open-cut coal mining to the north of the existing Baralaba North/Wonbindi North Coal Mines, and to introduce coal processing activities.

The EIS process was initiated by an application under section 71 of the EP Act made by Cockatoo Coal on 23 September 2013 for the preparation of a voluntary EIS. On 5 November 2013, the Department of Environment and Heritage Protection (EHP) approved the application under section 72 of the EP Act.

This assessment report has been prepared pursuant to section 58 (Criteria for preparing report) and section 59 (Required content of report) of the EP Act.

1.2 Criteria considered when preparing this report

Section 58 of the EP Act lists the criteria that EHP must consider when preparing an EIS assessment report. The criteria are:

a) the final terms of reference (TOR) for the EIS

The final TOR were issued to the proponent on 2 April 2014, and have been considered when preparing this EIS assessment report (Refer to section 3).

b) the submitted EIS

The submitted EIS comprises:

- the EIS (Volumes 1 to 4) that was available for public comment from 26 May 2014 until 7 July 2014
- the response to submissions and amendments to the EIS received by EHP on 15 August 2014
- the additional Figures 4-4a to 4-4h showing the groundwater drawdown contours in relation to Appendix D (Groundwater Modelling Assessment) received by EHP on 18 August 2014.

The submitted EIS has been considered when preparing this EIS assessment report.

c) all properly made submissions and any submissions accepted by the chief executive

EHP received 26 submissions on the submitted EIS within the submission period. All submissions were accepted under section 55 of the EP Act. Those submissions were received from the following stakeholders:

- three members of the public
- Aurizon
- Australian Government Department of the Environment
- Banana Shire Council
- Central Highlands Regional Council
- Construction, Forestry, Mining & Energy Union
- Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
- Department of Agriculture, Fisheries and Forestry
- Department of Education, Training and Employment
- Department of Energy and Water Supply
- Department of Housing and Public Works
- Department of Justice and Attorney General
- Department of Natural Resources and Mines

- Department of State Development, Infrastructure and Planning (DSDIP)
- Department of Tourism, Major Events, Small Business and the Commonwealth Games
- Department of Transport and Main Roads
- Fitzroy Basin Association
- Lock the Gate
- Outback Galore
- Powerlink Queensland
- Queensland Ambulance Service
- Queensland Fire and Emergency Services (including the State Community Safety Operations Branch)
- Queensland Health
- Queensland Police Service.

EHP provided its own submission on the EIS to the proponent.

The Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development also provided advice on water related aspects of the project (see section 5.10.1.5 of this report for further information).

In addition, there has been correspondence from stakeholders regarding the proponent's response to submissions on the EIS and amendments to the EIS as a result of the submissions. All submissions and other comments made by stakeholders on the EIS documents were considered when preparing this EIS assessment report.

d) the standard criteria

The standard criteria are listed in Schedule 3 of the EP Act, and have been considered when preparing this EIS assessment report.

e) another matter prescribed under a regulation

There are no other matters prescribed under a regulation that must be considered when preparing an EIS assessment report.

1.3 Required content of report

Section 59 of the EP Act outlines the required content of the report, which must:

a) address the adequacy of the EIS in addressing the final terms of reference (TOR)

The adequacy of the EIS in addressing the final TOR is addressed in section 5 of this report.

b) address the adequacy of any environmental management plan (EM plan)

An environmental management plan is not required for the project because the application to prepare a voluntary EIS was received and accepted by EHP after amendments to the EP Act that removed the requirement for an EM plan, which came into force on 31 March 2013.

c) make recommendations about the suitability of the project

Recommendations about the suitability of the project are outlined in section 6 of this report.

d) recommend any conditions on which any approval required for the project may be given

The recommended conditions for the environmental authority (EA) for the project are included in Appendix 1 of this report.

e) contain another matter prescribed under a regulation

Section 9 of the Environmental Protection Regulation 2008 requires an EIS assessment report to contain the following matters:

1. a description of the following:
    a. the project
    b. the places affected by the project

c. any matters of national environmental significance (MNES) likely to be affected by the project

2. a summary of the project's relevant impacts
3. a summary of feasible mitigation measures or changes to the project or procedures to prevent or minimise the project's relevant impacts, proposed by the proponent or suggested in a relevant submission
4. to the extent practicable, a summary of feasible alternatives to the project identified in the assessment process and the likely impact of the alternatives on MNES
5. to the extent practicable, a recommendation for any conditions of approval for the project that may be imposed to address impacts identified in the assessment process on MNES.

A description of the project and places affected by the project are outlined in sections 2 and 5.9.2.1 respectively of this report. The matters of national environmental significance (MNES) likely to be affected by the project are outlined in section 5.10.1 of this report. A summary of the project's relevant impacts and feasible mitigation measures or changes to the project are discussed throughout sections 5.10 and 5.11 of this report. A summary of feasible alternatives and the likely impact of the alternatives on MNES are discussed in section 5.2.1 of this report. Conditions of approval for the project to address impacts on MNES would be developed by the Australian Government Department of the Environment (DOTE) after the completion of the EIS process.

1.4 Completion of EIS process for the project

The giving of this report to Cockatoo Coal will complete the EIS process under the EP Act.

1.5 Accredited process for the controlled action under Commonwealth legislation

On 12 December 2013, DOTE determined the proposed project (EPBC 2013/7036) to be a controlled action under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions are sections 18 & 18A (listed threatened species and communities) and sections 24D & 24E (water resources). The EIS process for the BNCOP was accredited under An Agreement Between the Australian Government and the State of Queensland under Section 45 of the Australian Government EPBC Act relating to environmental assessment (commonly called the assessment bilateral agreement). Section 5.10.1 of this EIS assessment report includes an assessment of MNES and a copy of this report will be given to DOTE to assist the Commonwealth Minister with making a decision about the approval of the project and any conditions that should apply under Part 9 of the EPBC Act.

1.5.1 Independent Expert Scientific Committee

The Australian Government established an Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) in late 2012 through amendment to the EPBC Act. The IESC provides advice to the Commonwealth Environment Minister on research priorities to improve the understanding of potential impacts of coal seam gas and large mining developments on water resources. The committee can be requested by federal, state and territory governments to provide advice on water-related aspects of environmental impact assessments.

The EIS for the project was referred to the IESC on 13 June 2013 by DOTE and the Queensland Department of Environment and Heritage Protection. The committee's advice to the departments dated 18 July 2014 has been considered in the preparation of this assessment report (see section 5.10.1 of this report).

2 Description of the project

The project is known as the Baralaba North Continued Operations Project (the BNCOP). The BNCOP would expand the existing open-cut operations at the Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine from 1.75 million tonnes per year (Mt/y) of run-of-mine (ROM) coal production up to a maximum of 4.1Mt/y of ROM coal, to produce up to 3.5Mt/y of low volatile pulverised coal injection (PCI) and thermal coal products for export. The BNCOP would be on a new mining lease (ML) 80201 (currently an application) and within the existing ML80169 and ML80170. The BNCOP would be located to the north of the Dawson River Anabranch and would cover approximately 2,498 hectares (ha) with a projected disturbance footprint of approximately 1,912ha (Figure 2-1). The BNCOP is located approximately 115km south-west of Rockhampton, 7km north-west of Baralaba, 45km north of Moura, and 70km north-west of Biloela, in the lower (south-east) Bowen Basin region of central Queensland. The BNCOP is located within the Central Highlands Regional Council local government area.

Up to 750,000t/y and 1Mt/y of ROM coal respectively is currently extracted from the Baralaba Coal Mine on ML5605 and ML80157, and the Baralaba North/Wonbindi North Coal Mine on ML80169 and ML80170 (Figure 2-1). Total production from the Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine is approved up to 1Mt/y of product coal. The existing target resource of up to 750,000t/y of ROM coal at the Baralaba Coal Mine is anticipated to finish by the end of 2014. Cockatoo Coal examined the feasible alternatives to secure the long-term future of the Baralaba Coal Mine and concluded that the BNCOP is the preferred option to achieve the necessary rate of production to meet Cockatoo Coal's take or pay export commitments of 3Mt/y of product coal at the Wiggins Island Coal Export Terminal (WICET) and continue to export 0.5Mt/y of product coal through the RG Tanna Coal Terminal (RGTCT) at the Port of Gladstone. The BNCOP would be operated as a single open-cut mining operation on ML80169, ML80170 and ML80201.

Water would be supplied from multiple sources including pit dewatering from groundwater inflows, surface runoff captured in on-site water dams, existing water allocations from the Dawson River (up to 500ML), and treated and/or recycled water from an on-site Coal Handling and Preparation Plant (CHPP).

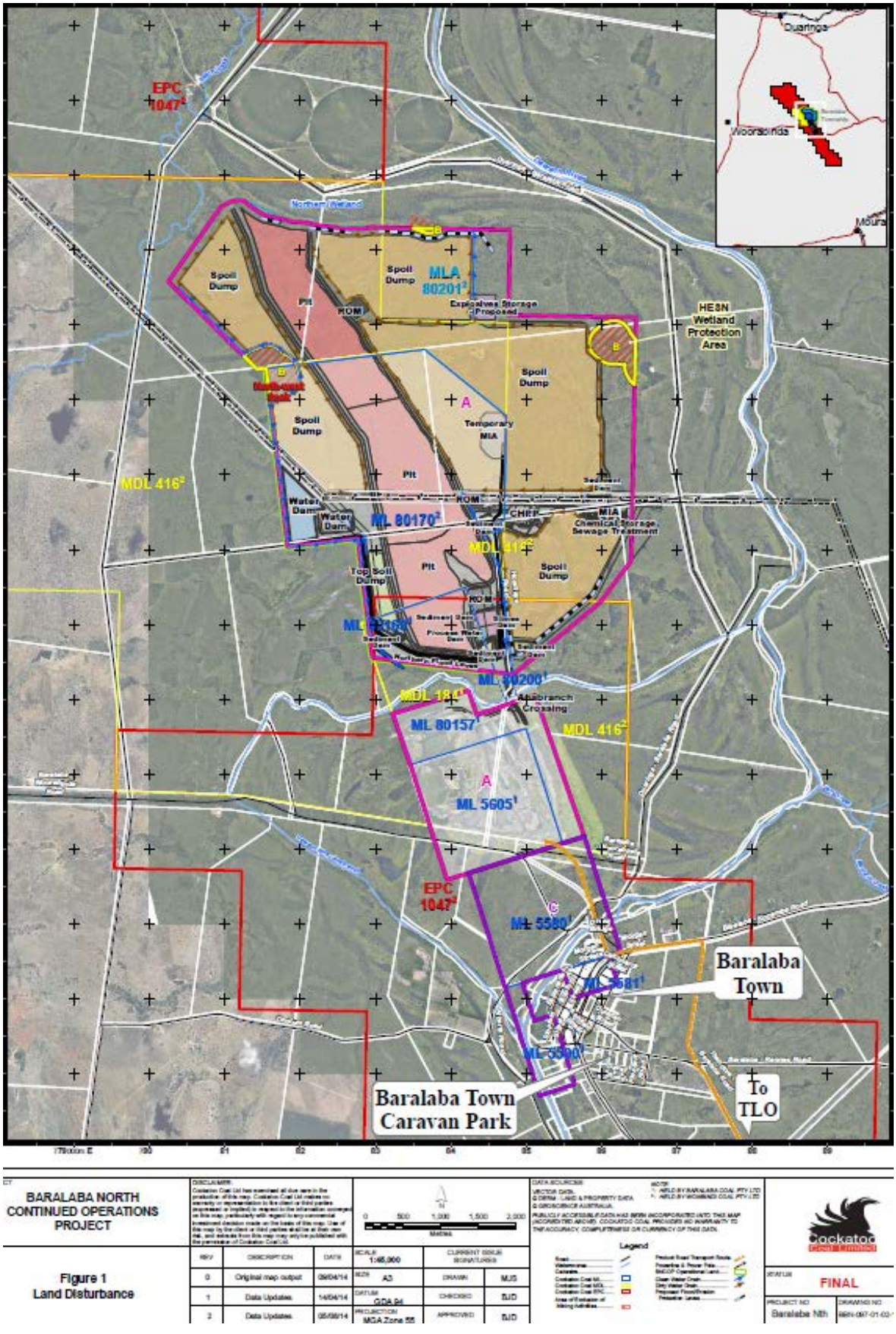
Electricity would be supplied via a 22 kilovolt (kV) overhead power line from the proposed Ergon Energy Baralaba substation. Power would be reticulated around the site via overhead and underground (buried) cables.

The BNCOP is one of several elements of the broader Baralaba Expansion Project which includes the approved upgrade and partial realignment of the existing product coal road transport route and the approved new train load-out (TLO) facility near Moura. The product coal road transport route and new TLO facility are discussed in section 5.10.8 of this report. The Baralaba Expansion Project was declared a prescribed project by the Minister for State Development, Infrastructure and Planning on 31 July 2013 pursuant to section 76E of the *State Development and Public Works Organisation Act 1971* (SDPWO Act). The declaration allows the Minister, amongst other things, to facilitate the undertaking of prescribed projects by providing for a scheme to ensure timely decision-making for prescribed decisions and prescribed processes. The BNCOP EIS process is subject to statutory timeframes specified under the EP Act. EHP has met or reduced all of its obligatory statutory timeframes under the EP Act (see section 3).

The nearest operating coal mine is the Anglo American owned and operated Dawson Mine located approximately 45km south-east of the BNCOP. Cockatoo Coal's Baralaba South Coal Project (BSCP) is currently being assessed by an EIS process under Chapter 3 of the EP Act and is proposed to be located approximately 15km south of the BNCOP, on the eastern floodplain of the Dawson River. The mine would produce up to 4.7Mt/y of ROM coal to produce up to 4Mt/y of product coal for up to 15 years. Coal would be processed on-site at a new CHPP, hauled by truck to the new TLO facility near Moura and railed to the Port of Gladstone for export. The EIS for the BSCP is currently due to be submitted by 2 April 2015.

The estimated capital cost for the development of the BNCOP, including the associated haul road upgrade and new TLO facility, is approximately $370 million.

Figure 2-1 Local context including project operations and mining tenure associated with the BNCOP (Source: Figure 1 of Attachment A of the Supplementary Report, August 2014)



The main elements of the BNCOP are highlighted in Figure 2-1 and would include:

- clearing 277ha of native vegetation communities and 1,167ha of previously cleared and disturbed land
- open-cut pit areas on ML80169, ML80170 and ML80201 covering 498ha
- in-pit and out-of-pit stockpiling of spoil on ML80169, ML80170 and ML80201 covering approximately 1,645ha
- backfilling coarse rejects and partially dewatered fine rejects from coal crushing and washing into the pit within spoil
- a series of site water management dams, levees and associated water management infrastructure
- progressive construction of new haul roads and light vehicle roads
- a final void at the northern end of ML80201
- construction and operation of a coal handling and preparation plant on ML80201
- workforce accommodation at the Baralaba Town Caravan Park
- upgraded administration and maintenance facilities at the Baralaba Coal Mine on ML80169 and establishment of new mine infrastructure areas at the Baralaba North/Wonbindi North mine on ML80170
- continued road transport of coal product along the majority of the length of the existing haul route, modified near Moura by the construction of an overpass of the Dawson Highway to remove coal haulage from the highway
- use of approved new product coal stockpiles and train load-out facility located 3km east of Moura, adjacent to the Dawson Highway
- continued rail transport of coal products along the existing Moura-Gladstone railway line to the WICET and RGTCT at the Port of Gladstone for export.

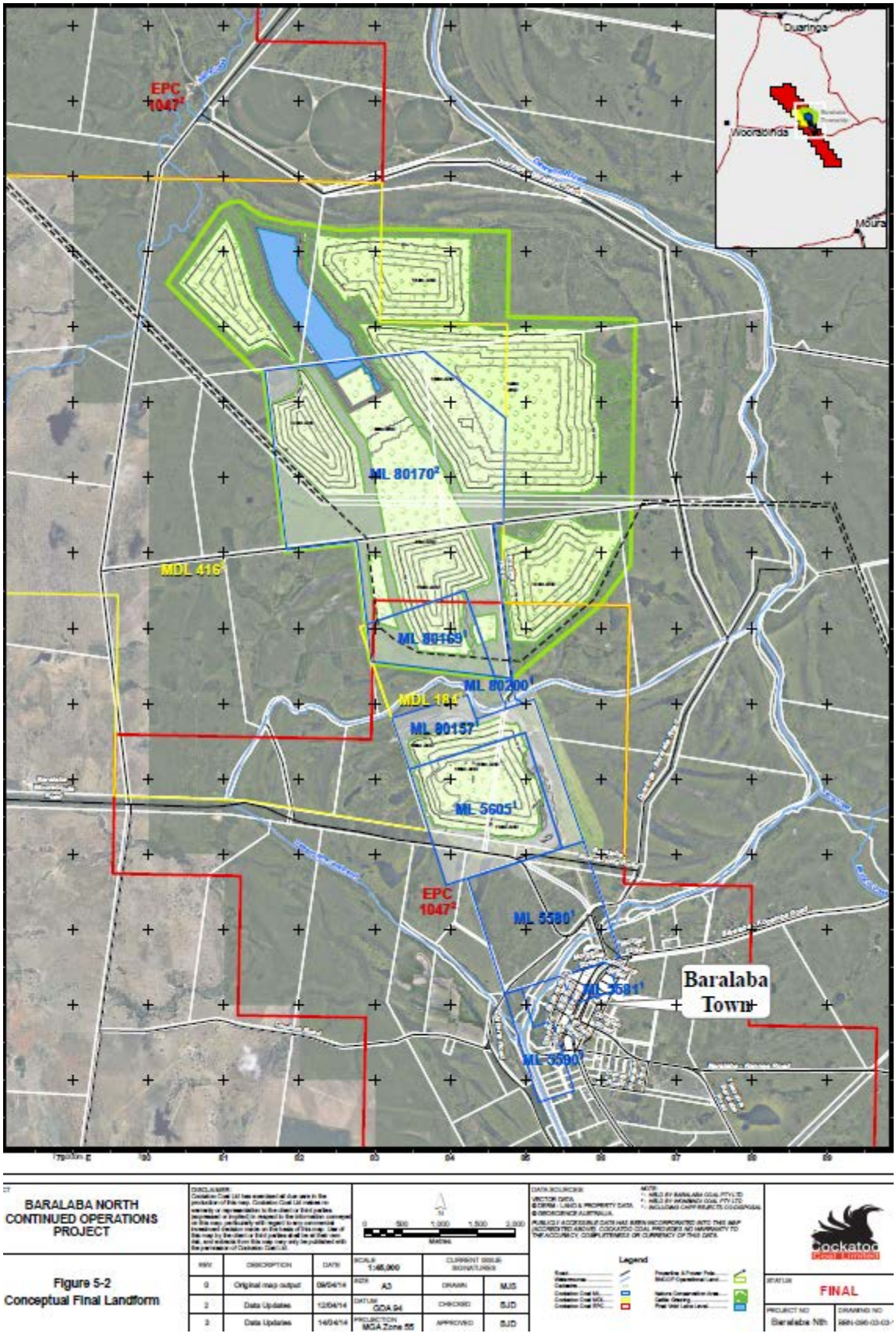
Cockatoo Coal proposes to begin construction and mine development activities in April 2015 and would be able to commence expanding coal production some 13 months later. A further 5 to 11 months of construction activities are anticipated to be required to achieve full coal production by early 2017, which would continue for approximately 15 years. The construction workforce during the project's 24 month construction phase is expected to peak at 130 personnel. The operational workforce for the project is expected to peak at 190 personnel, resulting in a combined (i.e. existing and expanded operations) peak operational workforce of 380 personnel. Short-term construction and development activities are expected to result in a peak construction and operational workforce of 430 personnel for short periods during the 24 month construction and operational phase overlap period. Approximately 25% of the construction and operational workforces are expected to be sourced from the local area and would reside in private houses and rental accommodation in nearby towns, travelling to the BNCOP daily by light vehicle. Approximately 50% and 25% of the construction and operational workforces respectively are expected to be sourced from the greater regional area on a drive-in-drive-out basis and a fly-in fly-out (FIFO) basis (e.g. from Brisbane) and would reside in accommodation owned by Cockatoo Coal, including the Baralaba Town Caravan Park (up to 350 rooms) and ten houses in Baralaba.

It is anticipated that mining operations would be on a 12.5 hour shift cycle roster, working seven days on, seven days off. Senior management and other staff would work on a five days on (Monday to Friday), two days off roster.

The conceptual final rehabilitated landform design for the final void, elevated landforms including spoil dumps and infrastructure areas would generally be consistent with the current Baralaba Coal Mine landform design criteria. A conceptual plan view of the proposed rehabilitated BNCOP landform design is shown on Figure 2-2. Key features of the conceptual final landform for the BNCOP include:

- a final void covering approximately 145ha located at the northern end of the Baralaba North pit on ML80201
- elevated landforms associated with out-of-pit spoil dumps covering approximately 1,139ha
- landforms at-grade or only slightly elevated above pre-mining topography associated with areas of the backfilled voids (covering approximately 353ha) and rehabilitated infrastructure areas (covering approximately 275ha).

Figure 2-2 Conceptual view of the proposed rehabilitated BNCOP landform design (Source: Figure 5-2 of the submitted EIS)



3 The environmental impact assessment process

Table 3-1 provides a timeline of the key steps of the EIS process under Chapter 3, Part 1 of the EP Act.

Table 3-1 Timeline for the Baralaba North Continued Operations Project EIS process

Step in the EIS process	Section of EP Act	Responsibility for taking step	Statutory due date	Date completed
Application to voluntarily prepare an EIS was received by EHP	ss. 70 & 71	Proponent	N/A[1]	23/09/2013
Decision to approve the voluntary preparation of an EIS was given to the proponent	s. 72	EHP	N/A[1]	3/10/2013
Written notice of decision to approve the voluntary preparation of an EIS was given to the proponent	s. 72	EHP	17/10/2013	5/11/2013
EHP received a draft terms of reference (TOR) for the project	s. 41(1) & 41(2)	Proponent	N/A	13/12/2013
Written notice about the draft (TOR notice) for public notification was given to the proponent and the comment period was set at 30 business days	ss. 42(1) & 42(2)	EHP	20/01/2014	9/01/2014
The TOR notice was published in The Australian, Rockhampton Bulletin and Central Telegraph newspapers	s. 43(1)	EHP	16/01/2014	10/01/2014
Copies of the TOR notice were given to interested and affected persons [no other persons were decided by the chief executive under s. 43(3)(c)]	s. 43(3)	Proponent	16/01/2014	13/01/2014
The draft TOR comment period commenced on 30 August and concluded on 8 October 2010 [30 business days in total]	s. 42(3)	N/A[1]	13/01/2014 to 24/02/2014	24/02/2014
Twenty-one sets of comments received during the comment period were given to the proponent	s. 44	EHP	10/03/2014	28/02/2014
EHP received advice in response to the 21 sets of comments	s. 45, & s. 11 of EP Reg.[2]	Proponent	28/03/2014	6/03/2014
EHP considered the proponents' advice, finalised the TOR, gave a copy of the final TOR to the proponent, published the final TOR on the EHP website and published notices about the final TOR in The Australian, Rockhampton Bulletin and Central Telegraph newspapers	s. 46, & s. 12 of EP Reg.[2]	EHP	4/04/2014	2/04/2014
The proponent submitted the EIS to EHP	s. 47	Proponent	2/04/2016	15/04/2014
Decision was made that the EIS was suitable to proceed	s. 49(1) & 49(2), & s. 13 of EP Reg.[2]	EHP	16/05/2014	16/05/2014

Step in the EIS process	Section of EP Act	Responsibility for taking step	Statutory due date	Date completed
Notice of decision that the EIS is suitable to proceed to public notification, and that the submission period would be 30 business days, was given to the proponent	ss. 49(3) to 49(5)	EHP	30/05/2014	16/05/2014
A copy of the EIS notice was given to interested and affected persons [No other persons were decided by the chief executive]	s. 51(2)(a)	Proponent	16/06/2014	22/05/2014
The EIS notice was published in the Australian (as prescribed under a regulation), The Courier-Mail and the Central Telegraph newspapers, and on the EHP website [No other way was decided by the chief executive]	s. 51(2)(b), & s. 8 of EP Reg[2]	Proponent	16/06/2014	23/05/2014 & 24/05/2014
The EIS submission period commenced on 26 May and concluded on 7 July 2014	s. 52(2)	N/A[1]	26/05/2014 to 7/07/2014	26/05/2014 to 7/07/2014
EHP received a declaration of compliance stating that a copy of the EIS notice had been given to interested and affected persons and that the approved form of the EIS notice had been published in relevant newspapers	s. 53	Proponent	6/06/2014	27/05/2014
Twenty-seven received and accepted submissions about the submitted EIS were forwarded to the proponent	ss. 55 & s56(1)	EHP	21/07/2014	18/07/2014
A response to submissions was received by EHP	s. 56(2)	Proponent	18/08/2014	15/08/2014
EHP considered the submitted EIS, the proponent's response to submissions and decided to allow the EIS to proceed under divisions 5 (EIS assessment report) and 6 (Completion of process)	ss. 56A(1), to 56A(3)	EHP	12/09/2014	12/09/2014
A notice of the decision to proceed was issued to the proponent	s. 56A(4)	EHP	26/09/2014	19/09/2014
EIS assessment report completed and issued to the proponent completing the EIS process	ss. 57 to 60	EHP	3/11/2014	

Table Notes: 1. N/A – Not applicable. 2. EP Reg – Environmental Protection Regulation 2008

4 Project approvals

The necessary approvals for the project are summarised in Table 4-1.

Table 4-1 Approvals required for the Baralaba North Continued Operations Project

Approval	Legislation (administering authority)	Detail
Approval to undertake an action that may impact on a matter of national environmental significance (MNES), including nationally listed threatened species and ecological communities and water resources. Refer to section 5.10.1 for details	EPBC Act (DOTE)	A copy of this report will be given to the Commonwealth Minister to assist with making a decision about the approval of the project and any conditions that should apply under Part 9 of the EPBC Act
Environmental authority (EA) amendment application	EP Act, Chapter 5 (EHP)	At the completion of the EIS process the proponent would apply to amend their existing EA for approval to mine up to 3.5Mt/y of black coal and to incorporate the new mining activities associated with the project (Recommended EA conditions are contained in Appendix 1)
Granting of mining lease	*Mineral Resources Act 1989* (Department of Natural Resources and Mines – DNRM)	After EHP has issued the EA to the proponent, DNRM would decide whether or not to grant Mining Lease 80201

Environmentally relevant activities

The EA would also authorise the following activities that are directly associated with, or facilitate or support, the mining activities, and which would otherwise require approval under the EP Act as environmentally relevant activities (ERAs) (listed in Schedule 2 of the EP Act):

- ERA 8 Chemical storage
- ERA 16 Extractive and screening activities
- ERA 33 Crushing, milling, grinding and screening
- ERA 63 Sewage treatment.

Notifiable activities

Notifiable activities are activities that have the potential to cause land contamination and are listed in Schedule 3 of the EP Act. The following notifiable activities being undertaken for the project would also be authorised under the project EA:

- 7. Chemical storage (other than petroleum products or oil)
- 15. Explosives production or storage
- 24. Mine wastes
- 29. Petroleum product or oil storage
- 37. Waste storage, treatment or disposal.

5 Adequacy of the EIS in addressing the final TOR

The final TOR for the BNCOP were issued to the proponent on 2 April 2014. The final TOR outline the information required to be included in the EIS for the project. A copy of the final TOR was included in Attachment A of Volume1 (Main report and Appendix A) of the EIS. The final TOR consist of two parts:

- Part A – About these terms of reference
- Part B – Content of the EIS.

Part A About these terms of reference

Part A of the final TOR provides some general information about the EIS process, including the statutory basis under the EP Act and EPBC Act, as well as where the proponent can access the EIS guidelines applicable to the assessment of the project.

Part B Content of the EIS

Part B of the final TOR provides the information requirements of the EIS. The adequacy of the EIS in addressing the information requirements in Part B of the final TOR is discussed below.

5.1 General approach

The general approach required to be used when preparing the EIS has been followed. The EIS gave priority to the critical matters (discussed below) associated with the project, as required by the final TOR. The EIS also provided a more detailed assessment of project issues determined to have a higher impact on the identified environmental values, as required by the final TOR.

5.2 Mandatory requirements of an EIS

The mandatory requirements imposed by the final TOR on the EIS have been met. The TOR included the following mandatory requirements that are discussed in further detail in subsequent sections of this report:

- project description, including all on and off lease activities relevant to the project, including project stages and timing (see section 5.9)
- details of the proponent, including any joint venture partners (see section 5.6)
- a description of the environmental values that must be protected (see section 5.10 Critical matters and section 5.11 Routine matters below)
- a description of irreversible impacts (see section 5.10 Critical matters and section 5.11 Routine matters below)
- baseline information, including the quality, source, age, reliability and uncertainties (see section 5.10 Critical matters and 5.11 Routine matters below)
- how the construction, operation and decommissioning of the project would be consistent with best practice environmental management (see section 5.10 Critical matters and 5.11 Routine matters below)
- how the mitigation strategies meet the requirements of the EHP model conditions. The mitigation strategies (summarised in sections 5.10 and 5.11 of this report) provide a framework for how the proponent intends to meet the performance outcomes in the final TOR. The EHP model conditions include outcome based conditions that have been designed to be applied to a project to achieve the performance outcomes in the final TOR. Consequently, by providing sufficient evidence in the EIS that the proposed mitigation strategies allow the performance outcomes to be achieved, the proponent is addressing this requirement. Refer to sections 5.10 and 5.11 for a discussion of the adequacy of the proposed mitigation strategies
- detailed strategies in regard to all critical matters for the protection, or enhancement of all relevant environmental values (see section 5.10 Critical matters below)
- conditions that can be measured and audited (the proponent included proposed conditions in section 6 of the EIS that are measurable and auditable, and are consistent with EHP's model mining conditions)

- impact minimisation measures including ongoing monitoring and adaptive management approaches (see section 5.10, Critical matters, and section 5.11, Routine matters, below).

5.2.1 Feasible project alternatives

Section 2.11.2 of the EIS adequately addressed the mandatory requirement of the final TOR for the EIS to consider the feasible alternatives of the project's configuration that may improve environmental outcomes.

The matters prescribed in section 9 of the Environmental Protection Regulation 2009 for this EIS assessment report are outlined in section 1.3 of this report and require, amongst other things, 'to the extent practicable, a summary of feasible alternatives to the project identified in the assessment process and the likely impact of the alternatives on MNES'.

The majority of the preferred project alternatives would result in similar, or less impacts on MNES, compared to alternatives that were not selected. Feasible alternatives do not include an alternative location for the mine due to geological and tenure constraints. Feasible alternatives assessed for the project, and the likely impact of the alternatives on MNES, are addressed in the following sections.

5.2.1.1 Mining method

The alternative mining methods considered for the project include open-cut and underground extraction techniques. Open-cut mining would have a larger environmental footprint than underground mining due to the need for out-of-pit spoil dumps and additional surface infrastructure such as haul roads and surface water management infrastructure. Therefore, at first sight, it appears underground mining may result in less direct impacts on MNES, including threatened species and ecological communities, due to less clearing activities and less overall surface disturbance. However, underground mining would also result in subsidence over substantial areas of the site, which could impact on the long-term health of threatened species and communities as a result of changes to overland flow patterns, surface water drainage and groundwater flow. Consequently, underground mining could result in a greater overall impact on MNES, including threatened species and ecological communities and water resources.

Furthermore, due to the proximity of the coal to the surface, the presence of faulting and the dipping nature of the coal seams (dip angles up to 55 degrees), the underground mining method for coal extraction is not currently technically or economically viable at the project site. Consequently, open-cut mining was identified as the most viable alternative for recovering the coal resource over the life of the BNCOP.

5.2.1.2 Minimising the project disturbance footprint

The following refinements to the mine design have reduced land disturbance and associated impacts on flora, fauna and ecological habitats:

- optimising the backfilling of the open-cut pit to reduce the overall mine disturbance footprint
- extending the height and extent of the existing spoil dumps rather than constructing new spoil dumps
- using the existing open-cut void for a water storage, instead of constructing new storages, if required
- adjusting the proposed general arrangement of infrastructure to avoid clearing the North-west soak and the wetland protection area of the HES-N wetland (refer to section 5.10.1.5 for information about these wetland features of the site).

Minimising the project disturbance footprint would result in a slightly smaller disturbance footprint on MNES, including threatened species and ecological communities.

5.2.1.3 Coal product transport

A comparative assessment of the relative environmental, social and economic implications on local landholders and the greater community of a number of alternative coal product transport methods were examined during the project feasibility stage, including:

- a dedicated rail line or conveyor system in a disused rail corridor
- road haulage across an Anglo American mining lease
- road haulage in a disused rail corridor
- the existing road haulage route, modified to remove coal haulage from the Dawson Highway (see section 5.10.8 of this report for details).

The first three options above were found to have a number of economic, environmental, social, legal, safety and/or business risk constraints, making these options less desirable and/or unfeasible. A noise assessment of the

existing road haulage route (Appendix H of the EIS) predicted that this option would meet the road traffic noise goals at all private residences within the vicinity of the transport corridor. A road transport assessment of the existing road haulage option (Appendix I of the EIS) concluded that a number of road upgrade works (see section 5.10.8 of this report for details) and stringent operational road haulage controls would allow the continued use of the existing transport route, without having a significant impact on the safety and efficiency of the road network. Consequently, the existing coal product haulage route was selected as the preferred option for coal product transport for the project.

Using the existing road haulage route to transport coal product from the project to the new TLO facility, rather than the other transport alternatives, would likely result in less surface disturbance and potentially less impacts on MNES, including threatened species and ecological communities.

5.2.1.4 Consequences of not proceeding with the project

Section 2.11.5 of the EIS addressed the mandatory requirement of the final TOR for the EIS to consider the consequences of not proceeding with the project. If the BNCOP were not to proceed, there would be the following consequences:

- the proponent would not meet its take or pay commitments at the WICET (see section 5.10.8.4 of this report for details)
- up to 130 direct construction and up to 190 direct operational phase jobs would not be created with the loss of their associated flow-on effects
- a net benefit of approximately $856 million would not be generated
- tax revenue to the Australian government would not be generated
- coal extraction and transport royalties to the State of Queensland would not be generated
- the potential environmental and social impacts and benefits of the BNCOP described in the EIS would not occur
- the biodiversity offsets and other revegetation areas of the BNCOP would not be established.

5.2.1.5 Novel or unproven elements of the project

The mandatory requirement of the final TOR for the EIS to describe the best practice environmental management of any unproven elements of the resource extraction, processing process, technologies or project activities is not relevant to the BNCOP, as project activities would be undertaken using proven conventional coal extraction and processing techniques and technologies.

5.3 Further requirements of an EIS

The EIS included sufficient information for EHP to prepare recommended approval conditions (see Appendix 1). The conditions are recommended for the EA amendment that the proponent will apply for after the EIS process has been completed.

The requirement of the final TOR for the EIS to predict the cumulative impact of the project on environmental values has been included in the assessment of critical and routine matters discussed in sections 3 and 4 of the EIS. The cumulative impacts of the project are generally considered to be low, largely because the BNCOP is a continuation of the existing mining activities and the mine plan has been designed to minimise the scale and magnitude of the short and long-term project impacts on the identified environmental values. Relevant subsections of sections 5.10 and 5.11 of this report discuss specific information about the predicted cumulative impacts of the project.

Section 6 (General environmental management commitments and model conditions) of the EIS addressed the requirement of the final TOR for the EIS to include a consolidated description of the proponent's commitments to implement management measures (including monitoring programs). Table 5-1 provides a summary of the proposed management measures and monitoring programs, and outlines how these relate to the proposed EA conditions.

Table 5-1 Summary of management measures and monitoring programs and relationship to the proposed EA conditions (Source: adapted from Table 6-1 on page 6-2 of the BNCOP EIS)

Proposed management plans and monitoring programs	Relevant proposed EA conditions
Plan of operations:	
• Rehabilitation monitoring program	Conditions F20 to F23 (Rehabilitation requirements, final land use and rehabilitation approval schedule and landform design criteria)
• Topsoil inventory	Condition F3 (Availability of suitable topsoil for rehabilitation)
• Emergency response plan	Conditions A16 and A17 (Risk management system and emergency response contingency planning)
Species management program	Not directly linked to an EA condition, but required under the Nature Conservation (Wildlife Management) Regulation 2006
Receiving environment monitoring program (REMP)	Conditions C21 to C24 (Description, objectives and content, monitoring and reporting requirements of the REMP)
Water management plan (WMP)	Conditions C31 to C36 (Objectives, content requirements and review requirements of the WMP)
Erosion and sediment control plan	Conditions C39 to C42 (Objectives and content requirements of the plan and relationship with the WMP)
Groundwater monitoring and management program	Conditions C43 to C47 (Objectives, content requirements, background monitoring and impact monitoring requirements, and groundwater contaminant trigger levels)
System design plan for integrated containment systems	Conditions G10 and G11 (Operational requirements of regulated structures)
Register of regulated dams	Conditions G29 to G34 (Requirements for maintaining and updating the register)
Weed management plan	Not directly linked to an EA condition, but required by other legislation
Blast management plan	Conditions E8 and E9 (A record of blasting on-site and reference to the relevant noise, air-blast over-pressure and vibration limits)
Topsoil management plan	Condition F2 (Process for stockpiling topsoil for rehabilitation)
Post mine land use plan (PMLUP)	Condition F18 (How to achieve the rehabilitation objectives)
Rehabilitation management plan	Condition F19 (How rehabilitation will be implemented, monitored and audited and contingencies for redesign, if necessary)
Post closure management plan	Conditions F24 and F25 (How to measure the success of the rehabilitation strategy)
Void management plan	Condition F27 (Void rehabilitation success criteria and final landform capability)
Biodiversity offset strategy	Conditions F32 and F33 (A strategy and timeframes for securing biodiversity offsets)

Proposed management plans and monitoring programs	Relevant proposed EA conditions
Waste management program	Condition D1 (Waste management control strategies and disposal procedures in accordance with the waste management hierarchy and procedures for dealing with spills of any hazardous wastes)
Conservation management plan for Dawson Valley Colliery	Condition I1 (A management strategy for the State heritage place – Dawson River Colliery under the *Queensland Heritage Act 1992*)
Cultural heritage management plan and Cultural heritage investigation and management agreement with the Gaangalu Nation People	Not directly linked to an EA condition, but required by the *Aboriginal Cultural Heritage Act 2003*
Social impact action plan	Not directly linked to an EA condition
Risk management system	Condition A15 (A risk management strategy in accordance with the Standard for risk management – ISO31000:2009) or the latest edition of the Australian standard for risk management)

The commitments and proposed monitoring programs were consistent with the management and monitoring requirements of the model mining conditions that have been used to develop the recommended conditions of the draft EA for the project (see Appendix 1).

The requirement of the final TOR for the EIS to describe the consultation that has taken place was discussed in sections 1.4 and 6.1.2 of the EIS. A public consultation report was included in Appendix M of the EIS. The proponent has undertaken consultation throughout the EIS process in accordance with the requirements of the guideline Preparing an Environmental Impact Statement for proponents (DISDIP, 2013). In addition to the statutory requirements for advertising public notices about the TOR and EIS and mailing the notices to interested and affected parties (as defined under sections 38 and 39 of the EP Act), the proponent undertook consultation with members of the public, government departments and other stakeholders before, during and after the public submission period of the EIS. Community project information sessions have been conducted in Baralaba and Moura, the outcomes of which have contributed to the social impact assessment for the proposed project.

Cockatoo Coal maintains a website (www.cockatoocoal.com.au) providing ongoing information about the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine, including mine planning and production details. Baralaba Coal Pty Ltd (a subsidiary of Cockatoo Coal – see section 5.6 below for details) also maintains a website (www.baralabacoal.net.au) that provides information about the BNCOP, including community newsletters and bulletins. Cockatoo Coal's community liaison team has been coordinating the community consultation process, and is available by telephone, or in person at Cockatoo Coal's community office in Baralaba, to speak with the community about any project issues.

Cockatoo Coal also established a community advisory group in January 2014 with meetings held at the start of each month and meeting minutes kept about the issues raised at each of the meetings. The community advisory group consists of representatives from the following areas of the community:

- Banana Shire Council
- Baralaba Police Service
- Local landholders
- Baralaba Aged Care services
- Moura Progress and Chamber of Commerce
- Local business owners.

The statutory requirements for consultation during the EIS process under Chapter 3 of the EP Act are discussed in section 3 of this EIS assessment report.

5.4 Executive summary

Volume 1 (Main report and Appendix A) of the EIS included an executive summary as a stand-alone section. The executive summary adequately described the project and conveyed the most important aspects and environmental management options in a concise and readable form, as required by the final TOR.

5.5 Introduction

Section 1 of the EIS included an introduction about the structure of the EIS document. Section 1.3.1 of the Introduction discussed the function of the EIS, why it has been prepared, and what it sets out to achieve, as required by the final TOR. It adequately discussed the legislative requirements under the EP Act and EPBC Act applicable to the assessment of the project proposal. Section 2.1.2 of the EIS provided additional supporting information about the project objectives and rationale.

5.6 Project proponent

Section 1.1 of the EIS included details about the project proponent that are consistent with the requirements of the final TOR. The proponent for the BNCOP is Cockatoo Coal Limited (Cockatoo Coal). Cockatoo Coal is listed on the Australian Stock Exchange and is a metallurgical coal producer with projects in the Bowen Basin, Galilee Basin and Surat Basin in Central Queensland (Qld). Cockatoo Coal is the owner of the existing Baralaba Coal Mine and the approved Baralaba North/Wonbindi North Mine. The Baralaba Coal Mine and Baralaba North/Wonbindi North Mine are managed by CCL's subsidiaries through a joint venture between Baralaba Coal Pty Ltd and Wonbindi Coal Pty Ltd.

Baralaba Coal Pty Ltd is a 62.5 percent (%) owned subsidiary of Cockatoo Coal (through Cockatiel Coal Pty Ltd), with the remaining 37.5% owned by JFE Shoji Trade Corporation (JFE Shoji) through JS Baralaba Wonbindi Pty Ltd (JSBW). Wonbindi Coal Pty Ltd is an 80% owned subsidiary of Cockatoo Coal, with the remaining 20% owned by JFE Shoji through JSBW.

5.7 The environmental impact assessment process

Section 1.3 and Attachment 2 (Regulatory approvals) of Volume 1 of the EIS discussed the environmental impact assessment process. Those sections adequately described the process to be followed and outlined how and when properly made public submissions on the EIS would be taken into account in the decision-making process, as required by the final TOR. Section 3 of this EIS assessment report provides a summary of the EIS process that was followed for the assessment of the BNCOP.

5.8 Project approvals process

Section 1.5 and Attachment 2 (Regulatory approvals) of Volume 1 of the EIS addressed the project approvals required for the BNCOP, including an approvals flowchart outlining opportunities for public comment. The proponent adequately described how the information in the EIS supports the approvals required prior to project commencement, as required by the final TOR. Project approvals are outlined in section 4 of this EIS assessment report.

5.9 Project description

5.9.1 Proposed development

The EIS adequately described the proposed development according to the requirements of the final TOR. The proposed development is outlined in section 2 of this EIS assessment report.

5.9.2 Site description

A site description is included in section 2 of the submitted EIS and adequately addresses the requirements of the final TOR. The following sections summarise a description of the site, including property ownership, transport infrastructure, geology and landforms, and soil types in the project area.

5.9.2.1 Property descriptions and underlying resource tenures

Table 5-2 provides a list of property owners within and adjoining the BNCOP area. With the exception of the Coominglah property, all land within the BNCOP area is owned by Cockatoo Coal. Surrounding land in the vicinity of the BNCOP is predominantly privately-owned. There are no pending resource activity lease applications over the project land.

Table 5-2 Property owners within and adjoining the BNCOP area (Source: Table 1-2 of the submitted EIS)

Affected person	Property Description
Claimant	
Gaangalu Nation People	Registered Native Title Claim (QC12/9-1 Gaangalu Nation) under the Commonwealth *Native Title Act 1993*
Freehold/Leasehold/State land owners	
Willeroo property owner	Operational land (Lot 7 KM44) Adjoining land (Lot 6 KM44, Lot 2 SP235019 and Lot 3 SP235019)
Dawson Dell property owner	Operational land (Lot 11 KM46)
Coominglah property owner	Operational Land (Lot 13 KM182, Lot 14 KM183 and Lot 26 KM256) Adjoining land (Lot 15 KM183)
Baralaba property owner	Operational land (Lot 9 KM45 and Lot 1 RP814083)
Anabank property owner	Operational land (Lot 10 KM45) Adjoining land (Lot 5 KM154 and Lot 2 RP814083)
Easement holders	
Central Highlands Regional Council	Duaringa-Baralaba Road Hoadleys Road Other minor roads/laneways Dawson River Anabranch
Powerlink Queensland	Lot A RP616373, Lot C RP616373, Lot B KM238, Lot A KM195, Lot A KM196, Lot A KM201 and Lot B KM252
Coal tenement holder	
Queensland Coking Coal Pty Ltd	Exploration Permit Coal (EPC) 1237
Petroleum tenement holders	
Arrow Energy Pty Ltd	Exploration Permit Petroleum (EPP) 831
OME Resources Australia Pty Ltd	Authority to Prospect (ATP) 758

Co-development agreements between Cockatoo Coal and the holders of the petroleum tenements would be developed, including the processes required to resolve any issues associated with co-existing coal mining and coal seam gas extraction, such as any interactions with oil/gas pipelines.

5.9.2.2 Transport infrastructure

Transport infrastructure relevant to the project is outlined in section 5.10.8 of this EIS assessment report.

5.9.2.3 Topography

The EIS adequately addresses the requirements of the final TOR for describing the topography in and surrounding the project area.

The topography of the Baralaba area is dominated by the Dawson River floodplain. The area is relatively flat with only slight undulation. Ground elevations range between 75m and 105m Australian Height Datum (AHD). The Baralaba township is sited adjacent to the Dawson River on relatively high ground, at approximately 93m AHD. At 433m AHD, Mount Ramsay is a key topographic feature in the region, located approximately 15km south of Baralaba township.

5.9.2.4 Geology and landforms

Information about the geology and landforms identified in the BNCOP area and surrounding region was used as input to: section 2.5.5 (Soils and land use); the surface water and groundwater assessments in sections 3.3 (Water resources) and 3.4 (Flooding and regulated dams) and their associated appendices; as well as section 5.2 (Rehabilitation at the BNCOP) and elsewhere within the submitted EIS.

The BNCOP coal resource is of Permian age in a structurally complex zone on the eastern limb of the Mimosa Syncline in the southern Bowen Basin. The indicative stratigraphy of the BNCOP coal deposit including the target coal seams lie in the Permian Baralaba Coal Measures, which are a co-relative of the extensive Rangal Coal Measures of the Blackwater Group. The target coal seams include:

- Doubtful
- Sub-Doubtful
- Dawson
- Dunstan
- Wright
- Coolum
- Dirty.

The coal measures generally strike in a north to north-westerly direction in the BNCOP area, and dip to the west, ranging between 25 degrees (°) and 55°. The strata are also variably folded, thrust faulted, more so in the south.

The main watercourses surrounding the BNCOP are the Dawson River, the Dawson River Anabranch and Saline Creek. Ephemeral wetlands (lacustrine and palustrine) also occur in and surrounding the project area. Due to past and ongoing agricultural activities (e.g. clearing, grazing, thinning, cropping), the BNCOP area is predominantly cleared land with patches of native vegetation. Vegetation is predominantly woodland/forest totalling approximately 277ha within the area of project disturbance.

The two main hydrogeological units within the Baralaba area are the Quaternary aged shallow alluvial aquifers and the Permian aged Blackwater Group. The Quaternary aged alluvial aquifer is associated with modern and relict drainage lines of the Dawson River and its tributaries. It comprises an upper layer of clay and silty clay overlying a basal layer of sand and gravel, ranging in total thickness up to 25m. The thickness of the unit generally decreases away from modern drainage lines and it is known to be absent in some parts of the Baralaba region. The degree of saturation of the alluvial aquifer is highly variable, with some locations displaying up to 5m of water at the base of the aquifer in areas close to present surface water channels, and at other locations the aquifer may be shown to be dry.

Groundwater has been encountered in both the coal seams and interburden of the Permian aged Blackwater Group, but is principally associated with the coal seams. A conjugate fault set exists to the north and west of the BNCOP area, inferred by the Saline Creek lineament and linear stretch of the Dawson River relict channel (Figure 9). An east-west fault was also identified during the transient electromagnetic survey along the centre of the Dawson River relict channel to the north of the BNCOP area and into this feature deep erosion and sediment infill has occurred.

5.9.2.5 Soil types and profiles

Information about the soils identified in the BNCOP and surrounding area was used in the land suitability assessment in section 4.1 (Land) and Appendix J (Soil and Land Suitability Assessment) of the EIS. The soil landscape units and associated soil types and spatial area and salvageable volumes for rehabilitation are outlined in Table 5-3. The BNCOP is located within zones identified and mapped as priority agricultural areas (PAA) under the Central Queensland Regional Plan, which includes areas mapped as potential strategic cropping land (SCL) under the repealed *Strategic Cropping Land Act 2011* (SCL Act). Refer to sections 5.11.1.4 and 5.11.1.5 for details about the assessment of SCL and PAAs.

Sixteen soil landscape units were recognised and mapped within the BNCOP area falling into the following soil types as defined by the Australian Soil Classification system:

- Vertosols (41%)
- Sodosols (31%)
- Kandosols, Dermosols and Tenosols (16% combined)
- Chromosols (12%).

The soils recommended for stripping are considered suitable for salvage and for the establishment of low to moderate sloped rehabilitated landforms without any specific management measures based on consideration of the following parameters:

- particle size distribution
- depth
- sodicity (a measure of erosion susceptibility)
- pH
- salinity.

However, general management measures recommended for all stripped soils are outlined in section 5.11.1.1 of this report.

Table 5-3 Soil landscape units and soil types identified within the BNCOP area (Source: adapted from Appendix J of the submitted EIS)

Soil landscape unit	Soil type	Soil landscape description	Spatial area (ha)	Salvageable volume (m^3)
2b	Vertosol	Moderately self-mulching, often silty, black cracking clay on level backplains within the lower floodplain	4.8	38,400
3a	Vertosol	Hardsetting to coarsely self-mulching, (poached), black cracking clay in narrow terrace drainage lines of the upper floodplain	13.5	94,500
3b	Sodosol	Hardsetting, clay loamy surfaced (0.2-0.4m), bleached, brown sodic texture contrast soil on level alluvial plains of Saline Creek and associated tributaries	6.2	21,700
4c	Vertosol	Moderately to strongly self-mulching, black cracking clay on elevated level backplains	69.6	278,400
4d	Vertosol	Weakly to moderately self-mulching, grey cracking clay with weak to moderate melonhole gilgai (VI <0.3-0.6m, HI 10-25m) on level backplains of the Dawson River	7.7	30,800
5	Vertosol	Firm pedal or weakly to moderately self-mulching, black cracking clay on gently undulating sideslopes/plains that mark the transition from recent alluvium to older elevated plains	28.7	57,400
7a	Vertosol	Hardsetting or firm pedal to weakly self-mulching, grey cracking clay with strongly developed melon-hole gilgai (VI 0.3-0.8m, HI 12-20m) on older clay sheets; saline, sodic and acidic at depth	240.6	240,600
7b	Sodosol/Dermosol/ Vertosol	Hardsetting, thin clay loamy surfaced (<0.05-0.2m), bleached, grey or brown sodic texture contrast soil grading to a grey or brown non-cracking/cracking clay ± occasional weak gilgai (VI 0.1m, HI 10m) on older unconsolidated sediments and clay sheets	201.6	302,400

Soil landscape unit	Soil type	Soil landscape description	Spatial area (ha)	Salvageable volume (m^3)
7c	Sodosol	Hardsetting, thick sandy surfaced (0.4-0.7m), bleached, often mottled, brown non-sodic to weakly sodic texture contrast soil on elevated relict alluvial deposits	174.5	872,500
7d	Sodosol	Hardsetting, clay loamy surfaced (0.10-0.2m), bleached, black sodic texture contrast soil on older unconsolidated sediments and clay sheets	82.2	123,300
8a	Kandosol	Hardsetting, massive, gradational loamy red earth overlying weathered Tertiary sandstone (>1.5m)	14.9	1,415,000
8b	Chromosol	Soft to loose, thick sandy surfaced (0.3-1.0m), bleached, strongly mottled, grey non-sodic texture contrast soil overlying insitu Tertiary sandstone from 0.8->1.5m	283	1,110,500
8c	Tenosol	Loose, massive, bleached, grey coarse sand on steeper colluvial footslopes	222.1	414,00
8d	Tenosol/Chromosol	Loose, massive red or brown earthy sand grading to a very thick sandy surfaced (1.0->1.5m), red or brown non-sodic texture contrast soil on gentle colluvial pediments and outwash deposits	34.5	632,000
9a	Chromosol/Dermosol	Hardsetting, loamy to clay loamy surfaced (0.2-0.3m), brown non-sodic texture contrast soil grading to a structured, brown non-cracking clay overlying calcareous sediments from 0.7m->1.5m	63.2	169,000
9b	Vertosol	Hardsetting to moderately self-mulching, black cracking clay with weak normal gilgai (VI <0.1-0.2m, HI 8-15m) overlying calcareous sediments from >1.2m	33.8	10,200
		Total =	**1471.1**	**5,810,700**

5.9.3 Climate

Section 2.3 of the EIS described the local and regional climatic conditions in the vicinity of the BNCOP. Climate information was used in subsequent sections and appendices of the EIS (particularly air, noise, surface water and groundwater assessments) to assist in making predictions about likely project impacts.

The EIS adequately described the local climate and how the climate would affect the potential for environmental impacts and the management of operations at the site.

The climate of the Baralaba region is sub-tropical with higher temperatures, rainfall and evaporation occurring over the summer months. Average annual rainfall (714mm) occurs mainly in the wet season months between November and March. Average monthly rainfall ranges from 116mm in February to 22mm in August. Evaporation peaks in the summer months and averages 250mm/month and 2,120mm/year, which is substantially higher than the corresponding average monthly and annual rainfall rates.

Temperatures are warmest during the summer months and coolest in the winter months with the highest average daily temperature ranging from 21.3° to 34.3° in January and the lowest average daily temperature ranging from 7.4° to 23.1° in July.

The prevailing wind directions are from the south during autumn and winter, the south-south-east during summer and the north during spring with wind speeds generally between completely still and 4.5m/s.

5.9.4 Proposed construction and operations

The EIS adequately described the proposed construction and operations as required by the final TOR.

5.9.4.1 Existing infrastructure

The existing infrastructure in the BNCOP area is used for mining activities associated with the approved Baralaba Coal Mine and the Baralaba North/Wonbindi North Coal Mine (Figure 2-1), and includes the following:

- conventional open-cut mining pits on ML5605, ML80157, ML80169 and ML80170
- a ROM pad for coal storage and dry coal screening equipment on ML5605 for receiving and processing coal
- product coal truck haulage route on ML5605 and ML5580 leading off-lease towards the Baralaba township
- administration and maintenance facilities on ML5605
- public access road on ML5605 via the Baralaba-Woorabinda Road
- mine water dam on ML80170 containing surface run-off for dust suppression and other non-potable site water requirements
- 1-in-1000-year annual exceedence probability (AEP) flood levees on ML80169
- a 132 kilovolt (kV) electricity transmission line (ETL) and easement traversing through the middle of ML80170.

5.9.4.2 Extractive and processing methods, associated equipment and techniques

The open-cut mining area for the BNCOP would be mined using conventional truck and shovel mining methods. The open-cut mining area is proposed to include supporting infrastructure such as haul roads, bunding, soil stockpiles, hardstands and water management structures and has been designed to integrate with the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Mine operations to minimise the amount of additional infrastructure required.

Mining method

A summary of the general open-cut mining activities and sequence includes:

- progressive vegetation clearing ahead of the open-cut operations and spoil dump construction over the life of the BNCOP
- stripping and stockpiling topsoil for progressive rehabilitation
- removing weathered overburden by excavator and haul truck and placing in out-of-pit spoil dumps, or infilling the mine void behind the advancing pit
- drilling and blasting competent overburden and interburden using standard rotary drills and rock crawler drills and a standard commercial blasting agent (i.e. ammonium nitrate–fuel oil mixture)
- removing blasted overburden and interburden by excavator and haul truck and placing in out-of-pit spoil dumps, or infilling the mine void behind the advancing pit
- exposing the underlying coal seams with dozers
- removing ROM coal by excavator and haul truck for haulage to the ROM pad at the CHPP for sizing, stockpiling and re-handling
- progressively profiling and rehabilitating landforms and spoil dumps.

Mine fleet and supporting plant and equipment

The existing fleet, plant and equipment currently being used to mine the Baralaba Central pit at the Baralaba Coal Mine includes:

- five excavators
- fifteen haul trucks
- five dozers
- two graders
- two loaders
- one service truck
- two water carts

- three drills
- diesel powered generators
- light service vehicles
- lighting plant.

The existing fleet, plant and equipment currently being used to mine the 1Mt/y of coal at the Baralaba North/Wonbindi North Mine includes:

- up to six excavators
- up to twenty-one haul trucks
- up to six dozers
- two graders
- two scrapers
- two loaders
- two service trucks
- two water carts
- two drills
- diesel powered generators
- light service vehicles
- lighting plant.

The mine fleet for the BNCOP is forecast to vary according to the equipment requirements associated with the advancing open-cut mining operations. The existing and approved mine fleets at the Baralaba Coal Mine and Baralaba North/Wonbindi North Mine would continue to be used, with replacement and some additional fleet items as mining progresses and ramps up to the planned maximum mining rate of 3.5Mt/y. The currently forecasted equipment includes:

- up to ten excavators
- up to forty-two haul trucks
- up to ten dozers
- up to four graders
- one scraper
- one loader
- up to four service trucks
- up to three water carts
- up to four drills.

An additional fleet would be required for coal processing activities at the new CHPP for the BNCOP including:

- up to nine light vehicles
- up to four front end loaders
- one dozer
- one bobcat/dingo
- one crane.

5.9.4.3 Sequencing and staging of mining activities

Coal mining including the removal of overburden and extraction of coal is scheduled to commence towards the end of 2015 and would continue for 15 years until 2030. The BNCOP would use existing infrastructure and supporting services at the Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine. Additional infrastructure and construction/development activities required to support the BNCOP would be progressively developed in parallel

with ongoing mining operations, including:

- new flood protection levee banks located to the north of the proposed explosives storage area and to the south-east of the CHPP infrastructure area and spoil dump designed up to the 1-in-1000-year annual exceedence probability (AEP) flood level (constructed over a 3 month period during the second quarter of 2015)
- a new mining infrastructure area (MIA) to provide adequate office, workshop and mine related infrastructure to support the increased scale of mining at the BNCOP (constructed over a seven month period commencing in the second quarter of 2015)
- a new CHPP and associated infrastructure including a process water dam and raw water dam to supply water to the CHPP and a slimes dam for the disposal of slimes generated during coal processing activities when space is unavailable for co-disposal or the capacity of the belt press filters is exceeded (constructed over a 10 month period commencing in the second quarter of 2015)
- improvements to the existing coal product road transport route including widening of the road and sealing currently unsealed sections (constructed over a 24 month period commencing in the fourth quarter of 2014) (see section 5.10.8 for further details)
- a new train load-out facility near Moura, and construction of the Dawson Highway underpass to provide grade separation for product coal transport and prevent interactions between haul truck movements and general traffic on the Dawson Highway (constructed over a 9 month period commencing in the fourth quarter of 2014) (see section 5.10.8 for further details)
- upgrades to the existing Moura Short Line (constructed over a 9 month period commencing in the fourth quarter of 2014) (see section 5.10.8 for further details)
- a staged expansion of the Baralaba Town Caravan Park (owned by Cockatoo Coal) to provide a total of 350 rooms to accommodate the construction and operational workforces (constructed over a 9 month period commencing in the second quarter of 2015)
- relocation of a 132kV ETL (owned and operated by Powerlink) that crosses the BNCOP area to the south of the Baralaba North/Wonbindi North Coal Mine (the relocation works would be undertaken by Powerlink in consultation with Cockatoo Coal in accordance with the requirements of the *Electricity Safety Act 2002*).

5.9.4.4 Chemicals and hazardous materials

The chemicals and hazardous materials to be used on-site include the following:

- ammonium nitrate for blasting overburden and coal
- acetylene for welding and cutting associated with construction, operation and maintenance activities
- liquefied petroleum gas as a fuel for forklifts
- diesel oil and fuels used as a fuel for vehicles and equipment and in various components of the CHPP
- lubricating oils and grease used to lubricate vehicle engine and hydraulic machines
- acetone used as a solvent and thinner and degreasing agent during various mining operations
- chlorine used for water treatment
- methyl isobutyl carbinol used in various components of the CHPP
- sodium hydroxide (caustic soda) used as a degreasing agent and for sewage treatment
- paints used during construction activities.

The environmentally relevant activities (ERAs) relevant to the project are outlined in section 4 of this EIS assessment report.

5.10 Assessment of critical matters

The critical matters discussed below are those aspects of the BNCOP that during project pre-lodgement discussions between EHP and the proponent, and from public submissions received during the public comment period on the draft TOR, were determined to have one or more of the following characteristics:

- a high or medium probability of causing serious or material environmental harm or a high probability of causing an environmental nuisance[1]
- considered important by the administering authority and/or there is a public perception that an activity has the potential to cause serious or material environmental harm or an environmental nuisance, or the activity has been the subject of extensive media coverage
- identified (in a referral decision) as a specific controlling provision under the EPBC Act.

5.10.1 Matters of national environmental significance

An assessment of the potential impacts of the Baralaba North Continued Operations Project (BNCOP) on matters of national environmental significance (MNES) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) was included in the submitted EIS.

This section has been written as a stand-alone component of the EIS assessment report. It addresses the requirements of the Queensland Government's assessment as specified by Schedule 1 of the bilateral agreement between the Australian Government and the Queensland Government relating to environmental assessment, section 59 of the *Environmental Protection Act 1994* (EP Act), and section 9 of the Environmental Protection Regulation 2008.

5.10.1.1 Controlling provisions and assessment approach

On 21 October 2013, Cockatoo Coal Limited referred the BNCOP to the Commonwealth Environment Minister for a determination as to whether the project would constitute a controlled action with respect to potential impacts on MNES.

On 12 December 2013, the delegate of the Commonwealth Environment Minister decided under sections 75 of the EPBC Act that the project is a controlled action for the relevant controlling provisions of listed threatened species and communities (sections 18 and 18A) and a water resource, in relation to coal seam gas development and large coal mining development (sections 24D and 24E) and that the project required assessment and approval under the EPBC Act before it could proceed.

The EIS process under Chapter 3, Part 1 of the EP Act for the BNCOP was accredited for the assessment of the project's impacts on the controlling provisions under An Agreement Between the Australian Government and the State of Queensland under Section 45 of the Australian Government EPBC Act relating to environmental assessment (commonly called the assessment bilateral agreement). The EIS process under the EP Act is administered by the Queensland Department of Environment and Heritage Protection (EHP).

The evaluation of potential impacts of the BNCOP on MNES presented in this report is based on information contained in the submitted EIS, which consists of the following documentation:

- the EIS (Volumes 1 to 4) that was available for public comment from 26 May 2014 until 7 July 2014
- the response to submissions and amendments to the EIS titled, "Baralaba North Continued Operations Project – Environmental Impact Statement – Supplementary Report – August 2014" received by EHP on 15 August 2014
- the additional Figures 4-4a to 4-4h showing the groundwater drawdown contours in relation to Appendix D (Groundwater Modelling Assessment) received by EHP on 18 August 2014.

[1] 'Material environmental harm', 'serious environmental harm' and 'environmental nuisance' are defined in Part 3, sections 15, 16 and 17 respectively of the *Environmental Protection Act 1994*

The Australian Government Department of the Environment (DOTE) has been consulted in relation to the assessment of potential impacts on MNES and proposed mitigation measures, and on the adequacy of information provided by the proponent, throughout the EIS process and during the preparation of this report, in accordance with the assessment bilateral agreement.

This MNES section of this assessment report contains two subsections about the potential impacts of the BNCOP on the controlling provisions:

1. Section 5.10.1.4 containing an assessment of the impacts of the BNCOP on listed threatened species and communities (section 18 and 18A of the controlling provisions)
2. Section 5.10.1.5 containing an assessment of impacts of the BNCOP on water resources by large coal mining development (sections 24D and 24E of the controlling provisions), including an evaluation of the proponent's response to the advice on water-related aspects of the BNCOP provided by the IESC (see below).

A copy of this report will be given to DOTE to assist the Commonwealth Minister with making a decision about the approval of the BNCOP and any conditions that should apply under Part 9 of the EPBC Act.

5.10.1.2 Independent Expert Scientific Committee

The Australian Government established an Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC) in late 2012 through amendment to the EPBC Act. The IESC provides advice to the Commonwealth Environment Minister on research priorities to improve the understanding of potential impacts of coal seam gas and large mining developments on water resources. Federal, state and territory governments can request the committee to provide advice on water-related aspects of environmental impact assessments.

The EIS for the project was referred to the IESC on 13 June 2013 by DOTE and EHP. A summary of the committee's advice to the departments dated 18 July 2014 and the proponent's response to the issues raised by the committee, as well as an evaluation of the adequacy of the proponent's response is provided in section 5.10.1.5 of this assessment report.

5.10.1.3 Description of the proposed action

The BNCOP provides for the continuation and expansion of open-cut coal mining at the Baralaba Coal Mine and Baralaba North/Wonbindi North Mine. The BNCOP would produce up to 4.1 million tonnes per year (Mt/y) of run-of-mine (ROM) coal to produce up to 3.5Mt/y of product coal, for up to 15 years. Currently, both the existing Baralaba Coal Mine and the Baralaba North/Wonbindi North Coal Mine produces up to 1Mt/y of product coal. The BNCOP is located approximately 115km south-west of Rockhampton, 45km north of Moura and 7km north-west of Baralaba. The BNCOP is within the lower Dawson sub-catchment area of the Fitzroy River, and the north-eastern part of the Brigalow Belt South bioregion. The target coal seams are located within the structurally complex zone on the eastern limb of the Mimosa syncline in the southern Bowen sedimentary basin.

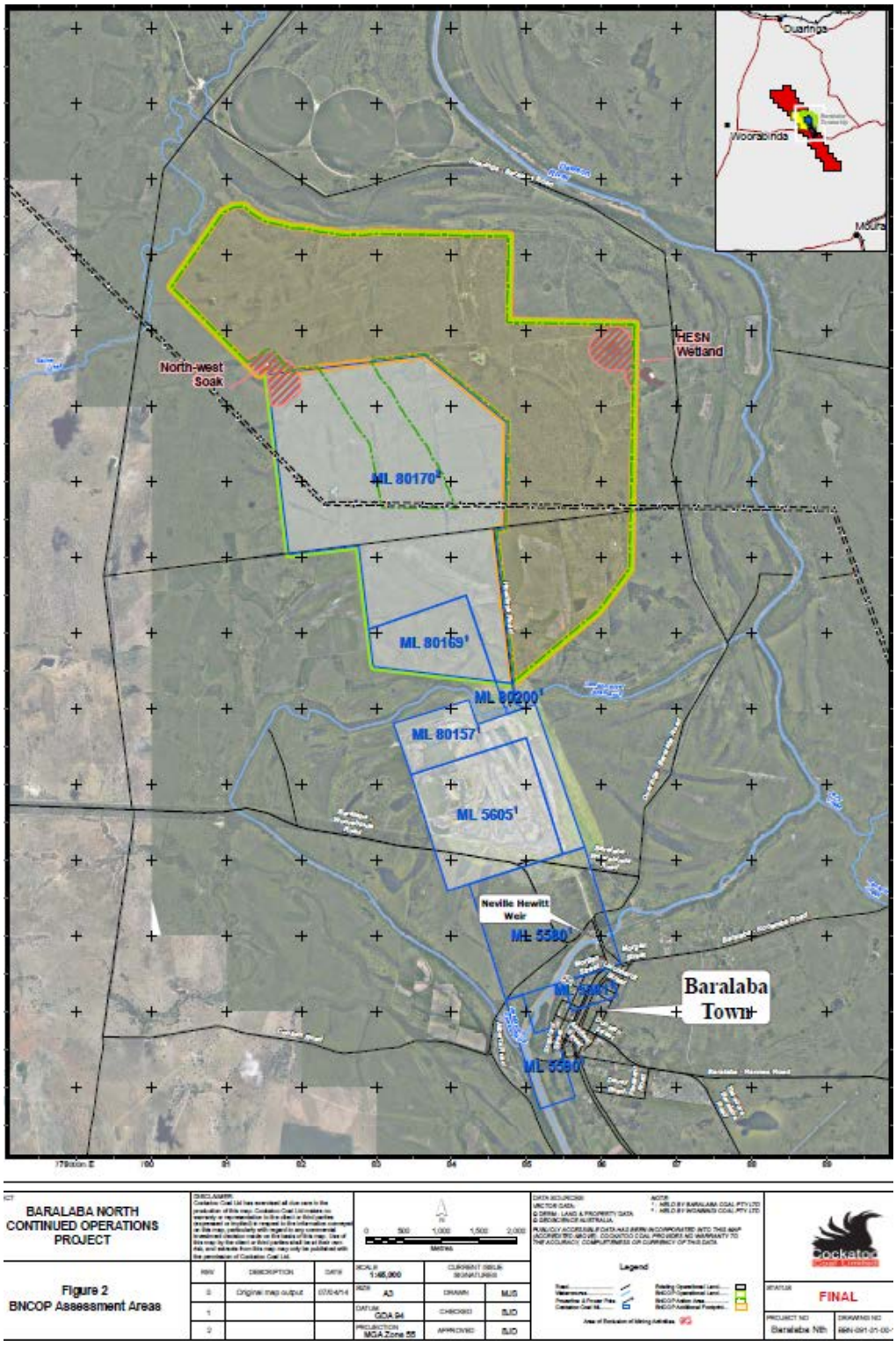
The action area of the BNCOP includes the additional unapproved extension of the open-cut footprint on ML80170 and the new mining activities proposed on ML80201 (currently an application and subject to approval by the Queensland Department of Natural Resources and Mines), but does not include the existing, approved Baralaba North/Wonbindi North Coal Mine open-cut footprint and mining activities on ML80170 and ML80169, or the existing approved Baralaba Coal Mine open-cut footprint and mining activities on ML80157, ML5605 and ML5580. The action area covers approximately 1,661ha (see Figure 5-1).

The property descriptions of the action area are shown in Table 5-4.

Table 5-4 Property descriptions of the action area (Source: Appendix Q of the submitted EIS)

Lot description	Tenure type
Lot 7 on KM44	Freehold/leasehold
Lot 11 on KM46	Freehold/leasehold
Lot 13 on KM182	Freehold/leasehold
Lot 14 on KM183	Freehold/leasehold
Lot 12 on SP256221	Freehold/leasehold
Lot 6 on KM44	Freehold/leasehold
Hoadleys Road	Road easement
Other minor roads/laneways	Road easement
Lot A on RP616373	Powerlink easement
Lot C on RP616373	Powerlink easement
Lot B on KM238	Powerlink easement
Lot A on KM195	Powerlink easement
Lot A on KM196	Powerlink easement
Lot A on KM201	Powerlink easement
Lot B on KM252	Powerlink easement

Figure 5-1 BNCOP action area (Source: Appendix Q of the submitted EIS)



The BNCOP would use existing infrastructure and service facilities within existing mining tenements at the Baralaba Coal Mine on ML80157, ML5605 and ML5580 and integrate operations within existing tenements at the approved Baralaba North/Wonbindi North Mine on ML80170 and ML80169. The main activities associated with the BNCOP would include:

- ROM coal production of up to 4.1 million tonnes per year (Mt/y) to produce up to 3.5Mt/y of product coal for an additional 15 years, including mining operations associated with:
    - continued development of the Baralaba North pit
    - extension of the Baralaba North pit to the north within ML80201 (currently an application)
    - a new spoil dump to the east of the Baralaba North pit within ML80201.
- exploration activities
- progressive partial backfilling of the mine void with spoil behind the advancing open-cut operations at the Baralaba North/Wonbindi North Mine
- continued and expanded placement of spoil in spoil dumps adjacent to the advancing northern pit
- progressive development of new haul roads and internal roads
- construction and operation of a CHPP at the Baralaba North/Wonbindi North Mine
- disposal of CHPP rejects on-site within the mine void behind the advancing open-cut mining operations
- progressive development of sediment dams and storage dams, pumps, pipelines and other water management equipment and structures (including flood protection levees on the floodplains of the Dawson River and Dawson River anabranch)
- continued development of soil stockpiles, laydown areas and borrow areas
- use of upgraded administration and maintenance facilities at the Baralaba Coal Mine and establishment of new mine infrastructure areas at the Baralaba North/Wonbindi North Mine
- other associated minor infrastructure, plant, equipment and activities, including minor modifications and alterations to existing infrastructure
- continued road transport of coal product along the majority of the length of the existing haul route, modified near Moura by the construction of an overpass of the Dawson Highway to remove coal haulage from the highway
- use of approved new product coal stockpiles and train load-out facility located 3km east of Moura, adjacent to the Dawson Highway
- loading of 3.5Mt/y of product coal onto trains for transport by rail along the Moura Short line (part of the Aurizon rail network extending 151km from Moura to the Port of Gladstone) for export via the Wiggins Island Coal Export Terminal (WICET) and RG Tanna Coal Terminal (RGTCT) at Gladstone.

Based on the planned maximum production rate, approximately 52Mt of product coal would be produced during the 15 year mine life of the BNCOP.

5.10.1.4 Listed threatened species and communities

Assessment methodology

Desktop terrestrial and aquatic flora and fauna studies were undertaken prior to the field surveys to identify the potential ecological values present within and surrounding the action area, particularly values that are protected under State and Commonwealth legislation.

Flora surveys (including tertiary and quaternary vegetation surveys as defined by Neldner et al, 2012) were carried out to verify desktop results, including targeted searches for threatened flora species, weed infestations, as well as surveys to identify the location, extent and condition of vegetation across the action area using the regional ecosystem framework and threatened ecological community criteria. Flora surveys were undertaken with consideration of the Methodology for Survey and Mapping of Regional ecosystems and vegetation communities in Queensland (Neldner et al. 2012). Flora surveys were primarily carried out after summer (between 12 and 21 April 2013) with threatened flora species searches conducted in both spring and autumn surveys. Surveys included 17 tertiary sites, 39 quaternary sites and 17 bio-condition assessments in areas representative of the assessment units.

Two vertebrate fauna surveys were carried out in the action area (after summer between 12 and 21 April 2013) and after winter between 19 and 29 October 2013), with particular focus on the actual or likely presence of threatened species and pest species, and the location, extent and condition of fauna habitats, particularly breeding habitats . Species' presence or absence were assessed through active searches, diurnal bird surveys, spotlighting, call play-back, bat detection, koala spot assessment, and trapping. Fauna surveys were undertaken with consideration of the relevant EPBC Act fauna survey guidelines.

Additionally, biodiversity assessment was carried out to identify areas of State, regional and local significance, including areas containing special ecological values such as high endemism, corridor function, or areas that are ecologically sensitive, such as wetlands and waterways.

Environmental values and potential impacts

The EIS stated that the proposed action area and surrounding landscape was extensively cleared and mostly used for agricultural activities with vegetation occurring in patches, often along watercourses.

The EIS identified four EPBC Act listed threatened ecological communities (TECs), one EPBC Act listed threatened flora species, and 17 EPBC Act listed threatened fauna species as potentially occurring in the action area based on desktop assessments. Flora and fauna surveys were also undertaken to identify whether these threatened species and TECs occur on-site.

The significance of impact for each listed species was assessed if any of the following parameters were found to apply:

- the species was known to occur within the action area
- there was a known occurrence and potential impact to habitat
- there was a likely potential of occurrence and potential for significant impact on habitat.

TECs

The following listed TECs where found to occur in the action area during flora surveys conducted on-site:

- brigalow (*Acacia harpophylla* dominant and co-dominant) (brigalow TEC) – endangered
- coolibah-black box woodland of the Darling Riverine Plains and the Brigalow Belt South Bioregions (Coolibah-black box woodland TEC) – endangered.

Threatened flora species

No threatened flora species were identified within the action area during flora surveys conducted on-site. Based on a desktop assessment of the availability of suitable habitat, *Cadelia pentastylis* was considered possibly occurring within the study area:

Possibly occurring

- ooline (*Cadelia pentastylis*)

Early assessment indicated that this species may be present within brigalow vegetation on-site. However, the ooline was not identified during field surveys and has since been found to be unlikely to occur due to the lack of suitable habitat identified within the project. Furthermore, the nearest record of this species is approximately 47km from the action area. Consequently, the EIS determined that it is unlikely that the project would have a significant impact on this species.

Threatened fauna species

The following listed threatened fauna species were found to occur in the action area during fauna surveys conducted on-site:

Confirmed as occurring:

- squatter pigeon (southern) (*Geophaps scripta scripta*) – vulnerable
- ornamental snake (*Denisonia maculata*) – vulnerable

Based on a desktop assessment of the availability of suitable habitat, the following species were considered possibly occurring or unlikely to occur within the study area:

Possibly occurring:

- south-eastern long-eared bat (*Nyctophilus corbeni*) – vulnerable
- red goshawk (*Erythrotriorchis radiatus*) – Endangered
- star finch (eastern) (*Neochima ruficauda ruficauda*) – Endangered
- Australian painted snipe (*Rostratula australis*) – vulnerable
- collared delma (*Delma torquata*) –vulnerable
- yakka skink (*Egernia rugosa*) – vulnerable
- Dunmall's snake (*Furina dunmalli*) – vulnerable
- Fitzroy river turtle (*Rheodytes leukops*) – vulnerable
- koala (*Phascolarctos cinereus*) – vulnerable.

The EIS determined that the project would be unlikely to have a significant impact on the red goshawk, star finch, Australian painted snipe and Fitzroy river turtle due to a lack of observations during surveying, a lack of records within 10km of the action area and the project avoiding potential habitat identified within the action area.

The EIS determined that there was a low likelihood that the collared delma and yakka skink would be present on-site and neither of these species was identified during field surveys. DOTE's Environmental Reporting Tool indicates that these species may occur within the study area (the tool provides a summary of relevant MNES values for a given region based on known observations and modelled habitat requirements). However, there are no records of the collared delma within 80km of the action area, and the closest records for the yakka skink are more than 30km from the action area. Furthermore, the EIS noted that only 7.5ha of the identified 82ha of potential collared delma habitat provides suitable microhabitat for this species. The EIS determined that the overall quality of the potential habitat for these species within the action area is poor. Consequently, it was determined that the project would not have a significant impact on these species.

The EIS determined that the project would be unlikely to have a significant impact on Dunmall's snake as this species was not observed during surveys, the closest record is further than 10km away and the elevation of the site is too low as the species shows a preference for habitat between 200m and 500m AHD (ground elevations of the project site range from 75m AHD to 105m AHD).

The koala was not observed on-site during field surveys and although the action would result in the clearing of 5ha of habitat containing Queensland blue gum, a known koala food tree species, the EIS determined that this was not critical to the survival of the koala. Consequently, it was determined that the project would not have a significant impact on the koala.

The EIS noted that the brigalow scaly-foot (*Paradelma orientalis*) was identified as possibly occurring on-site. However, this previously listed EPBC Act threatened species has since been de-listed by DOTE, and is not considered further in this assessment:

The EIS found the following species would be unlikely to occur at the project site:

Unlikely to occur:

- black-throated finch (*Poephila cincta cincta*) – Endangered
- black-breasted buttonquail (*Turnix melanogaster*) – vulnerable
- large-eared bat (*Chalinolobus dwyeri*) – vulnerable
- northern quoll (*Dasyurus hallucatus*) – vulnerable.

Potential impacts on TECs and threatened species habitat

Potential impacts to TECs would include:

- land clearance, resulting in the loss and fragmentation of extant vegetation
- habitat removal
- indirect impacts due to changes in surface water/groundwater dependant ecosystems, exotic flora, pest animals, dust, noise, artificial lighting, traffic movements, changes to landform, land and contamination, and bushfire.

Table 5-5 summarises the estimated current extent, and the likely amount of clearing, of each TEC within the action area.

Table 5-5 Estimated extent of TECs and proposed extent of clearing of each TEC (Source: Appendix Q of the submitted EIS)

Threatened ecological community (TEC)	EPBC Act status	Total extent within action area	Extent of clearing
Brigalow TEC	Endangered	14ha	9ha
Coolibah-black box woodland TEC	Endangered	1.5ha	Nil

Potential impacts to listed threatened fauna species would include:

- progressive clearing of potential habitat
- habitat fragmentation
- changes to feral animal predation and bushfire risk
- localised indirect impacts on surrounding habitats (dust, noise and edge effects).

Table 5-6 summarises the estimated extent of habitat for each threatened fauna species potentially occurring within the project area, and the likely extent of clearing of those habitats.

Table 5-6 Estimated extent of threatened fauna species habitat and proposed extent of clearing (Source: Appendix Q of the submitted EIS)

Common name (Scientific name)	EPBC Act status	Total extent of habitat within action area	Extent of clearing
Squatter pigeon (southern) (*Geophaps scripta scripta*)	Vulnerable	277ha	277ha
Ornamental snake (*Denisonia maculata*)	Vulnerable	33.5ha	33.5ha
South-eastern long-eared bat (*Nyctophilus corbeni*)	Vulnerable	277ha	277ha
Koala (*Phascolarctos cinereus*)	Vulnerable	5ha	5ha
Collared delma (*Delma torquata*)	Vulnerable	82ha	82ha
Yakka skink (*Egernia rugosa*)	Vulnerable	227.5ha	227.5ha

Further information about the profile of each threatened species and ecological community likely to be significantly impacted by the proposed action and the nature of the potential impacts of the project to each of those MNES is provided in Appendix 2:

- brigalow TEC
- coolibah black-box woodland TEC
- squatter pigeon (southern)
- ornamental snake
- south-eastern long-eared bat.

Cumulative impacts on listed threatened species and communities

The EIS stated that the proposed clearing associated with the BNCOP would equate to 0.2% to 0.6% of the remnant regional ecosystems in the combined Dawson River Downs and Woorabinda subregions of the Southern Brigalow Belt bioregion. The cumulative impact on the ornamental snake and squatter pigeon (southern) as a result of BNCOP was considered to be minor as:

- habitat degradation from grazing livestock was considered to be the most widespread threat to these species in the project area
- potential habitat where the ornamental snake was recorded would be avoided by the project
- the native vegetation communities to be cleared by the project were more widely occurring in the surrounding landscape and bioregion.

Proposed mitigation measures

To reduce adverse impacts, the proponent proposed the following measures:

- riparian vegetation within the Dawson River and Dawson River anabranch that is recognised as a fauna movement corridor will be retained
- 1.5ha of coolibah-black box woodland TEC within the action area will be retained due to refinements of the mine plan
- the design of mine layout will retain a 100m buffer between mining activities and the wetland in the north where the ornamental snake was found
- vegetation clearance procedures, including pre-clearance surveys, will be used to detect and relocate ornamental snakes and bats as per management plans
- a feral animal management strategy will be used to monitor and control feral animals, such as feral pigs, that can degrade ornamental snake habitat
- weed management (prevention, monitoring and control)
- exclusion of livestock from the mining lease for the life of the mine
- bushfire prevention
- site water management will avoid indirect impacts on habitat arising from the alteration of hydrology or water quality
- progressive rehabilitation using native species typical of the surrounding area.

Offsets proposed for residual impacts on TECs and listed threatened species

The EIS assessed the potential impacts of the proposed project on the brigalow TEC and the three listed threatened species against the MNES Significant Impact Guidelines and concluded that the project would result in residual significant impacts which would require offsets in accordance with the EPBC Act environmental offsets policy 2012.

The proponent committed to providing offsets for the following:

- 9ha of brigalow TEC
- 33.5ha of ornamental snake habitat
- 277ha of habitat suitable for both the squatter pigeon(southern) and the south-eastern long-eared bat

habitat.

The proponent proposed to provide an offset proposal to the Queensland and Australian governments prior to commencement of construction activities in accordance with the relevant offset legislation and policies (e.g. EPBC Act Environmental Offsets Policy, Queensland *Environmental Offsets Act 2014*). The offset approach and reporting framework would be stated in the offset proposal. The final terms of reference for the EIS required a discussion of the location, size, habitat quality, tenure arrangements and proposed offset management measures. This information was not included in the EIS and the proponent proposed to provide the required information in the offset proposal.

The proponent has commenced investigations to identify suitable offset areas focusing on adjacent proponent-owned land including brigalow woodland patches with known squatter pigeon (southern) habitat south-east of the project area, and other land containing potential ornamental snake habitat adjacent to areas in which that species has been recorded.

Major issues raised in submissions

DOTE requested that the proponent clearly identify the potential impact area of habitat critical to the survival of the ornamental snake. DOTE later clarified their request to mean the impact on important habitat as defined in the Draft Referral Guidelines for the Nationally Listed Brigalow Belt Reptiles (SEWPaC, 2011). The proponent was also requested to provide commitments to avoid and mitigate the impacts, and to provide an offset for any a residual significant impact. The proponent advised that 96.5ha of the 130ha of potential habitat for the ornamental snake within the action area, is highly unlikely to support the species because: it is highly disturbed from cattle grazing and previous clearing; there is limited suitable micro-habitat (e.g. fallen timber) and a lack of food supply (e.g. frogs). Consequently, 33.5ha of the 130ha of the potential habitat was determined to be important habitat for the ornamental snake that would require an offset. The Department of the Environment accepted the proponent's assessment that 96.5ha is not important habitat for the ornamental snake, and did not raise any further issues in this regard.

DOTE also requested further information about whether the greater brigalow community on-site was representative of the brigalow TEC listed under the EPBC Act. The proponent advised that many of the patches of brigalow were not of sufficient quality to meet the TEC criteria. However, the proponent confirmed that 9ha of the brigalow community was assessed as meeting the brigalow TEC definition under the EPBC Act, and the loss of this 9ha would be offset. DOTE accepted the proponent's assessment of the area of brigalow TEC occurring on the project site and did not raise any further issues in this regard.

DOTE requested detail of the proponent's survey effort for Fitzroy River turtle (*Rheodytes leukops*) and clarification in relation to potential habitat for this turtle species in the project area. The proponent responded with detail of the survey method used for the EIS which included the following:

- setting cathedral traps and fyke nets
- day-time searching for nesting sites and suitable nesting areas
- evening spotlighting for a period of one hour from a boat over a distance of 1km.

The proponent confirmed that no preferable habitat for Fitzroy River turtle was found in the action area. The preferable habitat in the Dawson River and Dawson River anabranch is located outside of the action area and would not be directly impacted by the project. DOTE accepted the proponent's assessment that no preferable habitat for the Fitzroy River turtle occurs on the project site, and did not raise any further issues in this regard.

DOTE asked the proponent to explain why they did not carry out targeted surveys for black-throated finch and large-eared pied bat in the action area. The proponent explained that no potential habitat for either species was identified in the action area and there were no database records of the Large-eared Pied Bat within an 80km radius of the action area. Further, there were only 2 database records of the Black-throated Finch within an 80km radius, the closest of which was some 42km to the north-west in the Dawson Range State Forest. DOTE subsequently accepted the proponent's justification for not conducting targeted searches for the black-throated finch and large-eared pied bat and did not raise any further issues in this regard.

DOTE and the Fitzroy Basin Association requested clarification of the project's offset liability for residual significant impacts that cannot be avoided or mitigated. The proponent responded with a commitment to provide offsets for residual impacts to brigalow TEC, ornamental snake habitat, squatter pigeon (southern) habitat, and south-eastern long-eared bat habitat in accordance with the EPBC Act Environmental Offsets Policy and the EPBC Act Offsets Assessment Guide. DOTE requires the proponent to prepare a biodiversity offset strategy for the residual impacts of the project on TECs and listed threatened species. Refer to the recommendations below for specific requirements of the offset strategy.

Conclusions and recommendations

The EIS used adequate studies, survey methods and effort to assess and quantify the potential impacts on listed threatened species and communities.

The cumulative impacts can be measured as the total impact on MNES values that would result from the incremental impacts of this project when added to the impacts of other projects with the Brigalow Belt bioregion. The proposed clearing for the project equates to between 0.02% and 0.06% of the extant remnant regional ecosystems within the subregions in which the project would be located. However, there are also 13 other development projects that will impact on Brigalow TEC, 11 projects that will impact on ornamental snake habitat, 12 projects that will impact on squatter pigeon (southern) habitat and one that will impact on south-eastern long-eared bat habitat. It is likely that the combined impacts from all the projects in the region on the brigalow TEC, ornamental snake habitat and squatter pigeon (southern) habitat will result in a high potential for cumulative impacts on these matters. However, in EHP's opinion the impacts on MNES values would be best addressed at the individual project scale by using the site-specific mitigation and management measures of the BNCOP.

The following recommendations address the key outstanding issues in relation to threatened species and communities:

Recommendation 1

The proponent should finalise the biodiversity offset strategy consistent with the EPBC Act offsets policy and offset assessment guide. This would include field surveys to confirm that the ornamental snake, squatter pigeon(southern) and south-eastern long-eared bat habitat are present at the proposed offset properties and to confirm that the condition and extent of the proposed offset areas are sufficient to offset the residual significant impact to 33.5ha of ornamental snake habitat, 277ha of squatter pigeon (southern) habitat and 277ha of south-eastern long-eared bat habitat.

Recommendation 2

In line with commitments made by the proponent in the EIS, EHP recommends that the person(s) undertaking the action for the project must not clear any coolabah-black box woodland TEC and must not clear more than:

- 9ha of brigalow TEC
- 5ha of koala habitat
- 82ha of collared delma habitat
- 33.5ha of ornamental snake habitat
- 277ha of squatter pigeon(southern) habitat
- 277ha of south-eastern long-eared bat habitat.

Recommendation 3

In order to achieve the best possible conservation outcomes for MNES within the project area, the proponent should communicate the presence of MNES to background landholders with the purpose of involving them and encouraging management of these matters in a manner not inconsistent with the conservation advice, recovery plan and threat abatement plans relevant to each MNES value.

Recommendation 4

The proponent should undertake pre-clearance surveys to ensure that impacts to MNES are as described in the EIS and summarised in this report. The proponent should incorporate results of pre-clearance surveys into reporting provided to DOTE and, where impacts to MNES are greater than those predicted, the person(s) undertaking the action must outline measures and/or provide offsets for these impacts.

5.10.1.5 Water resources

Sections 4.6, 4.7 and 4.8 of Appendix Q of the EIS contains a stand-alone assessment of the impacts of the project on water resources in the context of sections 24D and 24E of the controlling provisions under the EPBC Act. Additional supporting information about changes to hydrology (e.g. changes to flow regimes, recharge rates, aquifer pressure, groundwater table levels, groundwater/surface water interactions, river/floodplain connectivity, inter-aquifer connectivity) is included in Appendix B (Aquatic ecology assessment), Appendix C (Site water balance and surface water assessment) and Appendix D (Groundwater modelling and assessment). Appendix D also included a cumulative groundwater impact assessment of the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine and the action proposed to be undertaken under the EPBC Act. Appendix C also included a cumulative impact assessment of controlled releases into the Dawson River from both the action and the Baralaba South Project.

Assessment methodology

The identification of environmental values and the assessment of potential impacts of the BNCOP on surface and groundwater resources was based on the following methodologies:

Surface water and groundwater quality and quantity

- surface water and groundwater quality data from existing and previous monitoring programs in the Dawson River and Dawson River anabranch associated with the Baralaba Coal mine
- surface water quality data from the monitoring of controlled releases to the Dawson River anabranch in accordance with environmental authority (EA) conditions for the Baralaba Coal Mine
- long-term 'synthetic salinity' (electrical conductivity [EC]) data for the Dawson River from the Integrated Quantity Quality Model (IQQM)
- a transient electromagnetic (TEM) survey to define the alluvium
- water quality data in the Dawson River, Dawson River anabranch, Saline Creek, North-west Soak and the Northern Wetland
- groundwater quality at existing bores within and adjacent to the action area
- rainfall and evaporation records from the Bureau of Meteorology (BoM) weather stations
- rainfall records from the Baralaba Coal Mine weather station
- DNRM Dawson River flow gauge data.

Groundwater investigation program (incorporating the baseline groundwater data above)

- core test work (horizontal and vertical permeability) on 78 drill core samples from 6 drill holes
- groundwater level data from multi-level vibrating wire piezometers (VWP) and standpipe piezometers
- hydraulic conductivities from falling head slug tests.

Site water balance

- operational simulation (OPSIM) model used to simulate the operation of the water management system to assess the site water balance under varying rainfall and catchment conditions.

Mass balance

- a mass balance comparing chloride in rainfall to chloride in groundwater was conducted to confirm the adopted alluvium and Permian rainfall recharge rates.

Geological modelling

- a geological cross-section was prepared to show the thickness and extent of the alluvium, colluviums and regolith throughout the action area, as well as the measured groundwater levels in the surficial sediments, and measured or modelled river levels and flood levels
- a three-dimensional, 120km x 120km, regional, geological model was developed to provide layers for the groundwater model described below.

Groundwater modelling

- a regional, MODFLOW-SURFACT, three-dimensional, conceptual, groundwater model was developed to simulate the existing conditions of the groundwater regime and predict potential impacts on groundwater levels of the proposed mining activities for the BNCOP, including any cumulative impacts of the proposed Baralaba South Project.

Geomorphology

- a geomorphology assessment predicted the impacts of the BNCOP on the surrounding alluvium.

Flood modelling

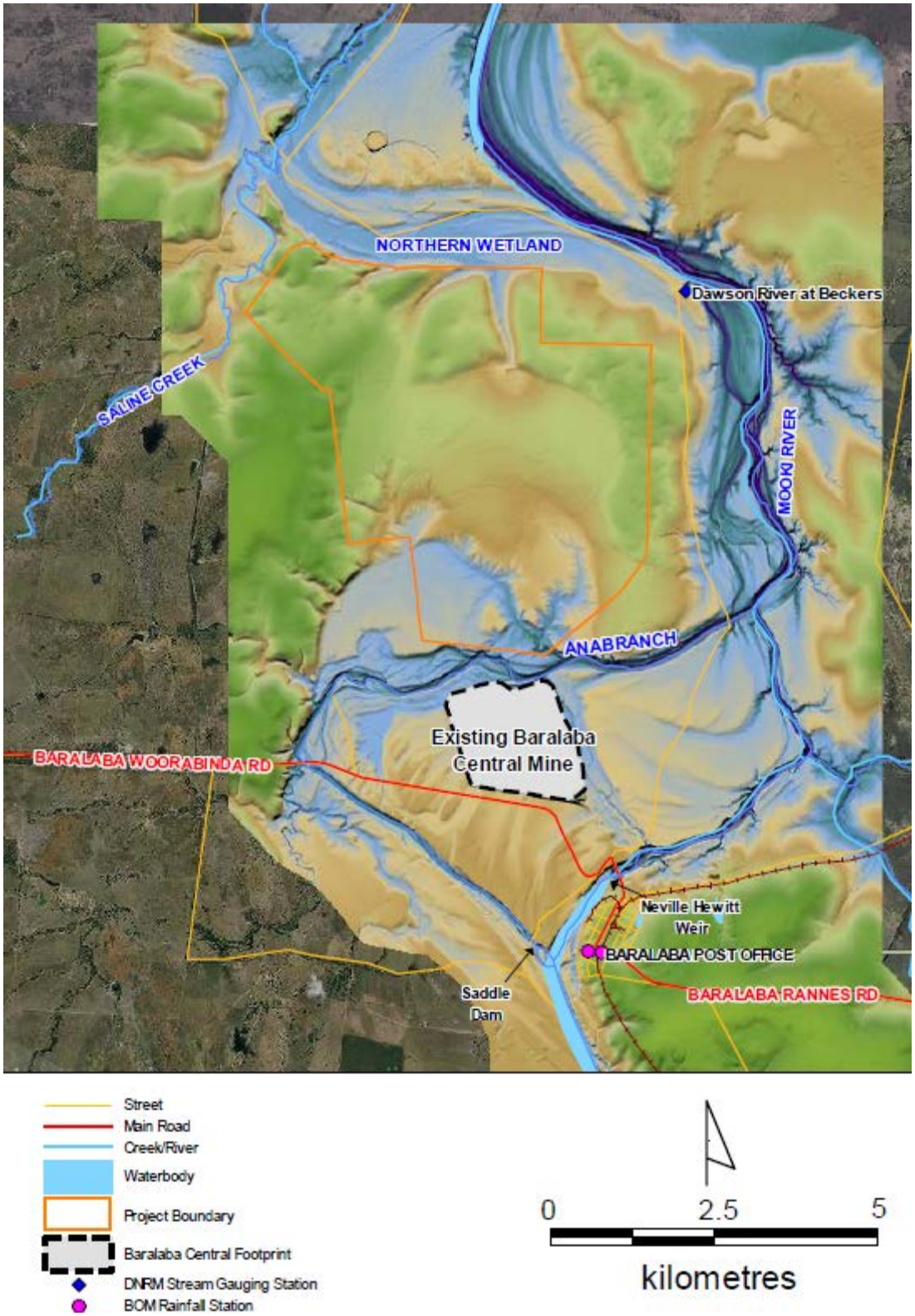
- The Baralaba North Flood Study (Water Solutions, 2012) assessed the potential flood-related impacts of the now approved Baralaba North/Wonbindi North Coal Mine covering areas adjacent to, and upstream of, the action area. The study has been revised and updated for the BNCOP flood modelling and assessment, including a review of stream gauge rating curves, extension and calibration of the hydraulic and hydrology models against a range of recorded data for the large December 2010/January 2011 flood event and an updated flood frequency analysis.

Existing hydrology

The BNCOP is located within the Fitzroy Basin, which has a total catchment area of approximately 142,600km^2. The BNCOP is located in the lower Dawson River catchment, which has an upstream catchment area of approximately 40,500km^2 to the Baralaba township in the vicinity of the project area. The major drainage features in the vicinity of the BNCOP include the Dawson River, the Dawson River Anabranch and Saline Creek. The Dawson River (including the Dawson River Anabranch) is a losing watercourse[2], particularly at Baralaba, where it is regulated by the Neville Hewitt Weir. Since the construction of the Neville Hewitt Weir in 1976, the Dawson River has had a median daily flow rate of approximately 14 megalitres (ML). Stream flow in the Dawson River is intermittent with a flow of less than 0.001m^3/s occurring more than 30% of the time. The BNCOP is positioned on the floodplain of the Dawson River (Figure 5-2). The Dawson River flows north between the Dawson and Auburn Ranges to meet the Fitzroy River west of Rockhampton. The Dawson River Anabranch flows in an easterly direction, immediately to the south of the boundary of the BNCOP. A minor ridgeline runs east-west across the BNCOP area and the northern portion drains to the Northern Wetland and Saline Creek. The Northern Wetland is a relict drainage line of the Dawson River that lies to the north of the BNCOP boundary. The catchment area of the Northern Wetland is approximately 17km^2. The wetland is ephemeral, changing in size due to rainfall and flooding from Saline Creek and the Dawson River. Saline Creek is also ephemeral, and flows north-east past the north-western boundary of the BNCOP, before joining the Dawson River further downstream. The catchment area of Saline Creek is approximately 50km^2 to the point of the BNCOP boundary and approximately 292km^2 to the junction of the Dawson River. The southern portion of the BNCOP area drains directly into the Dawson River anabranch and the Dawson River.

[2] A losing watercourse typically loses water from stream flow into its bed and banks rather than being fed by groundwater from ‘bank storage’.

Figure 5-2 Surface water drainage features in the vicinity of the BNCOP (Source: Figure 2-1 of Attachment A of the Supplementary Report, August 2014)



Groundwater regime

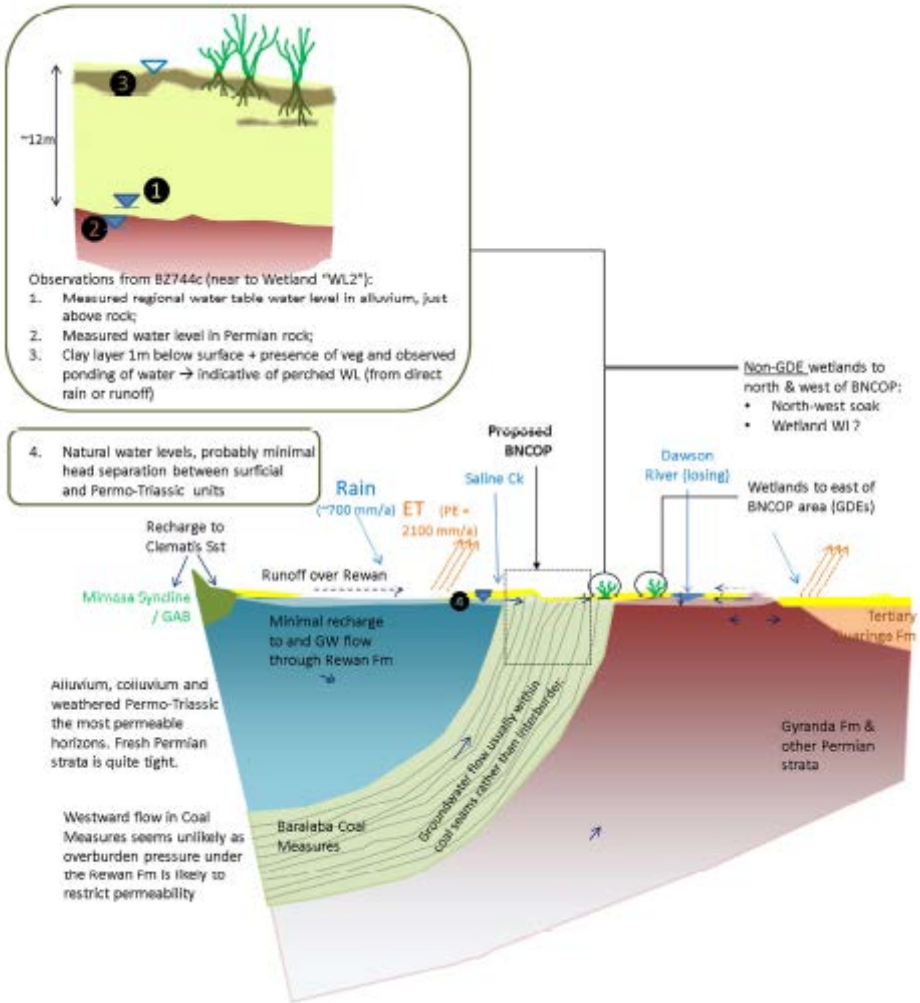
The two main hydrogeological units and their characteristics within the Baralaba area are the:

- Quaternary aged shallow alluvial aquifers associated with modern and relict drainage lines of the Dawson River and its tributaries including Saline Creek and the Dawson River anabranch, comprising an upper layer of clay and silty clay overlying a basal layer of sand and gravel, ranging in total thickness up to 25m Close to surface water sources, a perched water table, above the regional groundwater table, is evident
- Permian aged Blackwater Group including all of the coal seams and associated interburden of the Baralaba Coal Measures, comprising groundwater principally associated with the coal seams and in the sandstone/siltstone units of lower permeability.

The typical depth of groundwater in the BNCOP area is generally 10m to 20m below the surface with low recharge rates generally less than 1% of rainfall and high evaporation rates. The Rewan Formation, which overlies the Baralaba Coal Measures, and older units such as the Gyranda Formation, which underlies the Baralaba Coal Measures, act as aquitards. The Rewan Formation in particular is thick (up to 500m), and intervenes between the target coal seams for the BNCOP and the Great Artesian Basin (GAB) aquifers. The conceptual groundwater system in the vicinity of the BNCOP is shown in Figure 5-3.

The BNCOP is located outside of any declared groundwater management areas. Groundwater in the vicinity of the BNCOP is unsuitable for use in agricultural and domestic applications due to high salinity levels.

Figure 5-3 Conceptual groundwater system in the vicinity of the BNCOP (Source: Figure 3-11 of section 3.3 of the submitted EIS)



Wetland features associated with the BNCOP and surrounding area (Figure 5-4) include:

- The Northern Wetland (designated WL2) located adjacent to the boundary of ML80201
- The North-west Soak, located on the western boundary of ML80201
- two smaller wetland areas of high ecological significance: one designated as HES-S that is located adjacent to the eastern boundary of ML80201; and another designated as HES-N that is located just inside the eastern boundary of ML80201.

The North-west Soak and the Northern Wetland are ephemeral, palustrine wetlands that are unlikely to be dependent on, or connected to, the regional groundwater table. They are considered to exist due to the presence of clays in the shallow subsurface, which allow perched water tables to develop and persist after rain or flood events. There are areas of Brigalow (*A. harpophylla*) TEC and Coolibah-Black Box Woodland TEC associated with these wetlands, floodplain areas and the Dawson River Anabranch. A survey of the HES-S and HES-N wetlands concluded that the actual condition and value of these wetlands do not support the designation of these wetlands as high ecological significance.

Water quality

Surface water quality

Water quality of the Dawson River is generally characterised by low levels of electrical conductivity (EC). Based on the available data sets since 1994, there appears to be an upward trend in EC since 2011. Comparison of EC levels at downstream and upstream monitoring points along the Dawson River since 2011 indicate that a significant portion of the elevated EC is attributed to activities within the catchment upstream of the existing Baralaba Coal Mine. A summary of local and regional water quality for the Dawson River, including a comparison with all of the water quality objectives (WQO) is provided in section 3.2.2 of the EIS. Historic water quality for the Dawson River at the Beckers gauging station is provided in Appendix C of the EIS (Site water balance and surface water assessment). Local EC levels range from 70 microSiemens per centimetre (µS/cm) up to 790µS/cm, with a mean value of 201µS/cm. The mean EC value is within the guideline WQO in the Dawson River sub-basin for EC of 340µS/cm. Local pH levels range from 6.8 to 8.2, with a mean value of 7.5. The mean pH value is within the guideline WQO in the Dawson River sub-basin, which stipulates a pH range between 6.5 and 8.5. Total suspended solids (TSS) range from two milligrams per litre (mg/L) up to 682mg/L, with a mean value of 108mg/L. The guideline WQO in the Dawson River sub-basin for TSS is 10mg/L, so the background level is already significantly higher than the WQO. Turbidity levels range from 1 nephelometric turbidity units (NTU) up to 1120NTU, with a mean value of 196NTU. The guideline WQO in the Dawson River sub-basin for turbidity is 50NTU, so the background level is already significantly higher than the WQO.

With regard to metals and inorganics, mean concentrations of aluminium, copper, zinc and nitrate exceeded the ANZECC (2000) trigger values for 95% species protection in slightly to moderately disturbed ecosystems. The mean concentrations of boron, arsenic, manganese and ammonia were within the ANZECC trigger values for 95% species protection in slightly to moderately disturbed ecosystems.

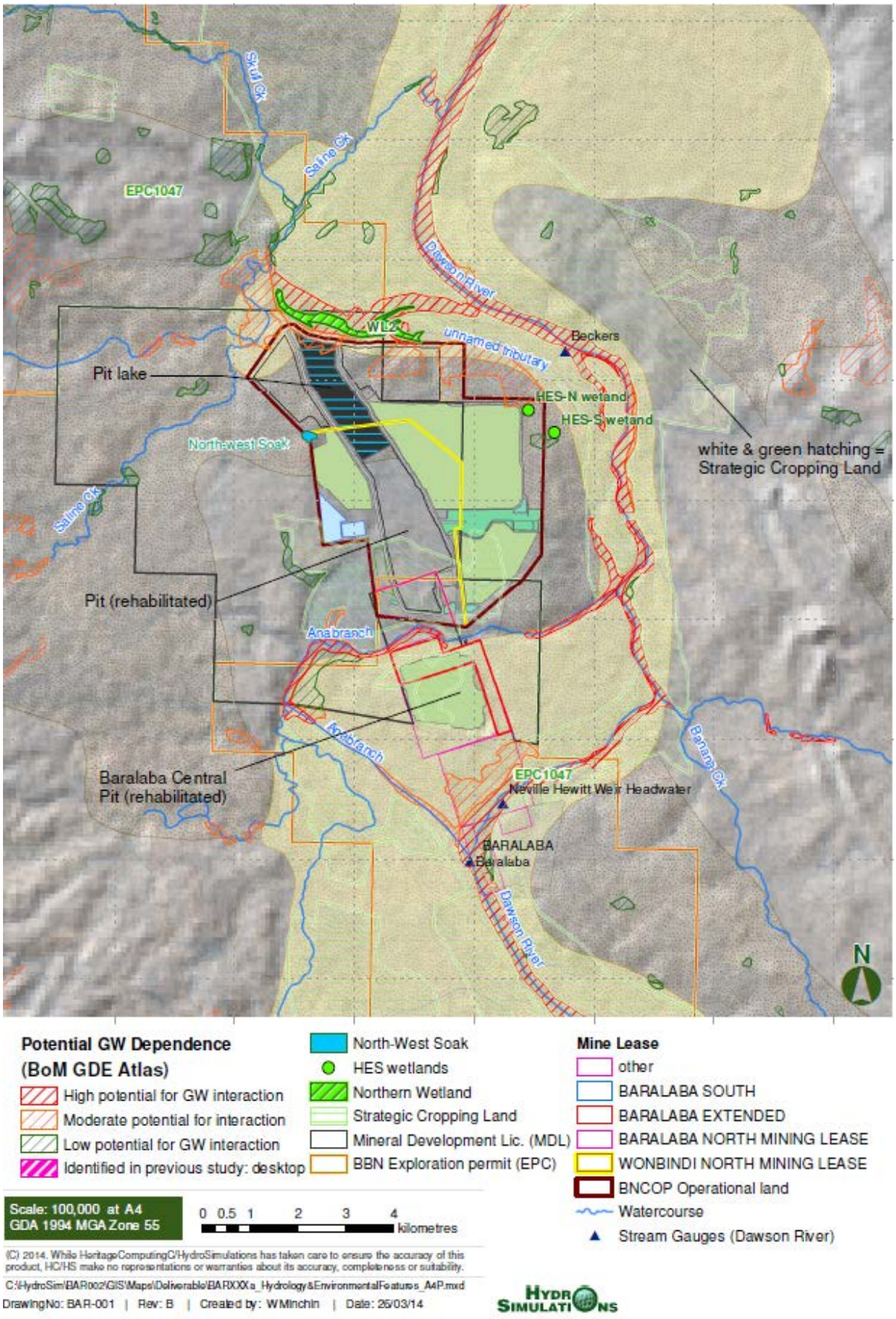
The mean concentrations of total nitrogen, total phosphorus and chlorophyll-a exceeded the WQOs for the Lower Dawson Main Channel and Northern Upland Tributaries. However, the mean sulfate concentration was within the WQO for the Lower Dawson Main Channel and Northern Upland Tributaries.

Groundwater water quality

The median recorded values for salinity in the BNCOP locality are approximately 500mg/L in alluvium, and between 2,000 and 4,000mg/L in the Permian strata (including the coal measures). The analysis conducted in the groundwater modelling and assessment in Appendix D of the EIS shows the alluvial salinities are fairly consistent in the Baralaba North/Wonbindi North Mine and BNCOP areas and, on the whole, are lower than those measured at the BSCP area (approximately 15km south of the BNCOP). The Permian strata salinities are more variable and cover a wide range of values, with no obvious spatial pattern related to cause. Groundwater in the vicinity of the Baralaba Coal Mine, Baralaba North/Wonbindi North Mine and the BNCOP is unsuitable for use in agricultural and domestic applications due to high salinity levels.

The values measured for pH are confined to a narrow range for both alluvial groundwater and Permian groundwater. Both waters are close to neutral at their median values (6.9 for alluvium and 7.2 for Permian). Overall, the Permian groundwater is slightly more alkaline.

Figure 5-4 Wetland features of the BNCOP area
(Source: Figure 2-8 of Appendix D of the submitted EIS)



Potential impacts

Surface water flow regimes

The maximum captured catchment areas during the life of the BNCOP and following completion of mining are provided in Table 5-7.

Table 5-7 Maximum captured catchment area of the BNCOP (Source: Table 3-6 of the submitted EIS)

Catchment	Maximum captured catchment area	
	During mining	After mining
Dawson River (to Beckers stream gauge)	Approximately 0.01%	No measurable change
Saline Creek	<1%	-0.1%
Northern Wetland	52%	23%

The flood modelling assessment for the 1-in-20-year, 1-in-50-year and 1-in-100-year annual exceedence probability (AEP) flood events show that the Dawson River overflows the western river bank to directly inundate the Northern Wetland for the 1-in-50-year and 1-in-100-year AEP flood events. The Northern Wetland is also affected by Saline Creek flooding for the 1-in-20-year AEP event.

A simplified hydraulic assessment was undertaken to estimate the likely frequency of flooding of the Northern Wetland by Saline Creek for events less than the 1-in-20-year AEP event. The simplified hydraulic assessment concluded that water from Saline Creek is likely to overflow into the wetland during a 1-in-2-year AEP event, indicating that there is a better than 50% chance each year that the Northern Wetland will experience flood inflows from Saline Creek. Due to these flood inflows, the impacts on total inflows into the Northern Wetland will be less than that indicated by the captured catchment area.

The Groundwater Modelling and Assessment concluded that potential impacts on baseflow contributions to Saline Creek, the Dawson River Anabranch and Northern Wetland would be limited primarily due to the pronounced unsaturated depth, and therefore there would be relatively little contribution to flow in watercourses from aquifers (i.e. baseflow). Potential impacts on baseflow to rivers and creeks adjacent to the BNCOP would therefore also be negligible.

No adverse water-related impacts are likely to occur on habitats surrounding the BNCOP (e.g. Dawson River, Dawson River Anabranch or the Northern Wetland to the north of the BNCOP area) because no measurable impacts on surface water quality are likely to occur from changes in surface water; and no measurable impacts on surface water quantity or quality are likely to occur regardless of changes in captured catchment areas and groundwater drawdown.

Runoff and contaminants

The results of the site water balance model indicate that there is a low risk of the BNCOP water management system accumulating water over the 15 year mine life and that the system recovers well after each wet season. The model results indicate there will be no uncontrolled spills of mine affected water from the mine water dam or process water dam.

Available geochemical information indicates that the run-off draining to most of the sediment dams should have low salinity. Overflows would only occur during significant rainfall events, which would likely generate run-off similar to that from surrounding undisturbed catchments.

Acid rock drainage

The geochemistry assessment in Appendix E of the EIS concluded that the overburden generated from the BNCOP would generally be expected to be non-acid forming (NAF) with negligible quantities of potentially acid forming-low capacity (PAF-LC) overburden also expected to be present. The overall risk of acid conditions developing at the BNCOP was therefore considered to be negligible.

Coarse rejects and slimes produced during coal processing at the CHPP would generally be expected to be NAF, with some potentially acid forming (PAF), uncertain and PAF-LC material also expected to be present. However, coarse rejects and slimes are expected to comprise less than 1% of the volume of all mining waste handled during the life of the BNCOP. Refer to section 5.11.3 of this report for further information about the management of spoil and coarse rejects and slimes.

Controlled releases

The results of the site water balance and surface water assessment in Appendix C of the EIS show that there is negligible impact on the downstream water quality through controlled releases from the BNCOP. A summary of the potential impact of controlled releases on downstream water quality in the Dawson River was included in the Supplementary Report (August 2014). The results of the water balance model indicate that there would likely be 150 release days over the 15 year life of the project. No releases (and hence no impact on downstream water quality) would occur 97% of the time during the 15 year life of the project. The proportion of assimilative capacity of the receiving environment used by the discharges during the 150 release days was also assessed. The assimilative capacity was defined as the difference between the upstream Dawson River water quality and the corresponding WQO for each parameter. It was noted in the assessment of assimilative capacity that for some parameters the existing upstream Dawson River concentration already exceeds the WQO. The results were indicative of the worst case impacts based on the minimum dilution ratio for each flow scenario (low, medium and high). The overall results of the water balance model predict a negligible impact on the downstream water quality as a result of controlled releases from the BNCOP. The results are summarised as follows:

- during low, medium and high flow release scenarios, nearly all of the water quality parameters in the Dawson River downstream of the discharge location meet the corresponding WQOs, with site discharges consuming less than 50% of the available assimilative capacity for these parameters in the Dawson River
- during the medium flow release scenario, ammonia, turbidity, suspended solids and EC are predicted to exceed the corresponding WQOs, because for each of these parameters the WQOs were already exceeded in the Dawson River upstream of the discharge location
- during the high flow release scenario, EC is predicted to take up 65% of the assimilative capacity in the Dawson River downstream of the discharge location, but would not exceed the WQO.

Alteration of groundwater quality

There is not expected to be any measurable change in the quality of groundwater (Permian, alluvial or colluvial) as a consequence of mining, and therefore there would be negligible impact on surface water quality in downstream waters due to the interaction with groundwater.

Groundwater aquifers

Permian Aged Blackwater Group

The maximum effect of the BNCOP at or after the end of mining would be a drawdown in the Baralaba Coal Measures of about 10m at the edges of the mining footprint. However, the presence of faults is predicted to reduce the severity and extent of drawdown within the hydrogeological units to the north. Furthermore, the cone of depression is predicted to be reduced in the east by the absence of the Baralaba Coal Measures, and in the west by the presence of the Rewan Formation. Notwithstanding this, the numerical modelling conducted for the groundwater assessment in Appendix D of the EIS predicts negligible impact on groundwater levels or groundwater yield for groundwater users with privately owned bores registered on the Queensland groundwater bore database. This is because the closest bore is located 2km to the south, which is right on the edge of the predicted cone of depression. Furthermore, no groundwater bores within the area of predicted drawdown are currently being used, largely due to the high salinity levels.

The average predicted pit inflows over the life of the BNCOP are predicted to be approximately 2.4ML/day (877ML/annum) with a peak rate of approximately 3.5ML/day. However, a significant proportion of this volume of water would be lost to evaporation (which is approximately three times greater than mean annual rainfall), which would reduce the volume of pit water that will require active management.

Quaternary Aged Alluvial Aquifers

Drawdowns are predicted in the regional water table to the north of the BNCOP, including under the North-west Soak and Northern Wetland. The most significant drawdown occurs late in the life of the BNCOP, with maximum drawdowns occurring after mining ceases. However, because the EIS studies indicate these two wetlands exist because of perched water tables, the predicted drawdown impact on them is expected to be negligible.

No net drawdown in the regional water table is predicted to the east of the BNCOP around the HES-N and HES-S wetlands. Even if these wetlands do not rely on perched water tables, any small drawdown impact at these sites would be offset by an increase in recharge and elevated water table conditions in the spoil dumps that are proposed for the area between the wetlands and final void.

Rewan Formation

The Rewan Formation has relatively low permeability. No wetlands are dependent on groundwater from the Rewan Formation, and it is not exploited as a water resource. Consequently, the issue is not the potential for drawdown within the Rewan Formation, but the potential for the Rewan Formation to transmit drawdown stress to overlying

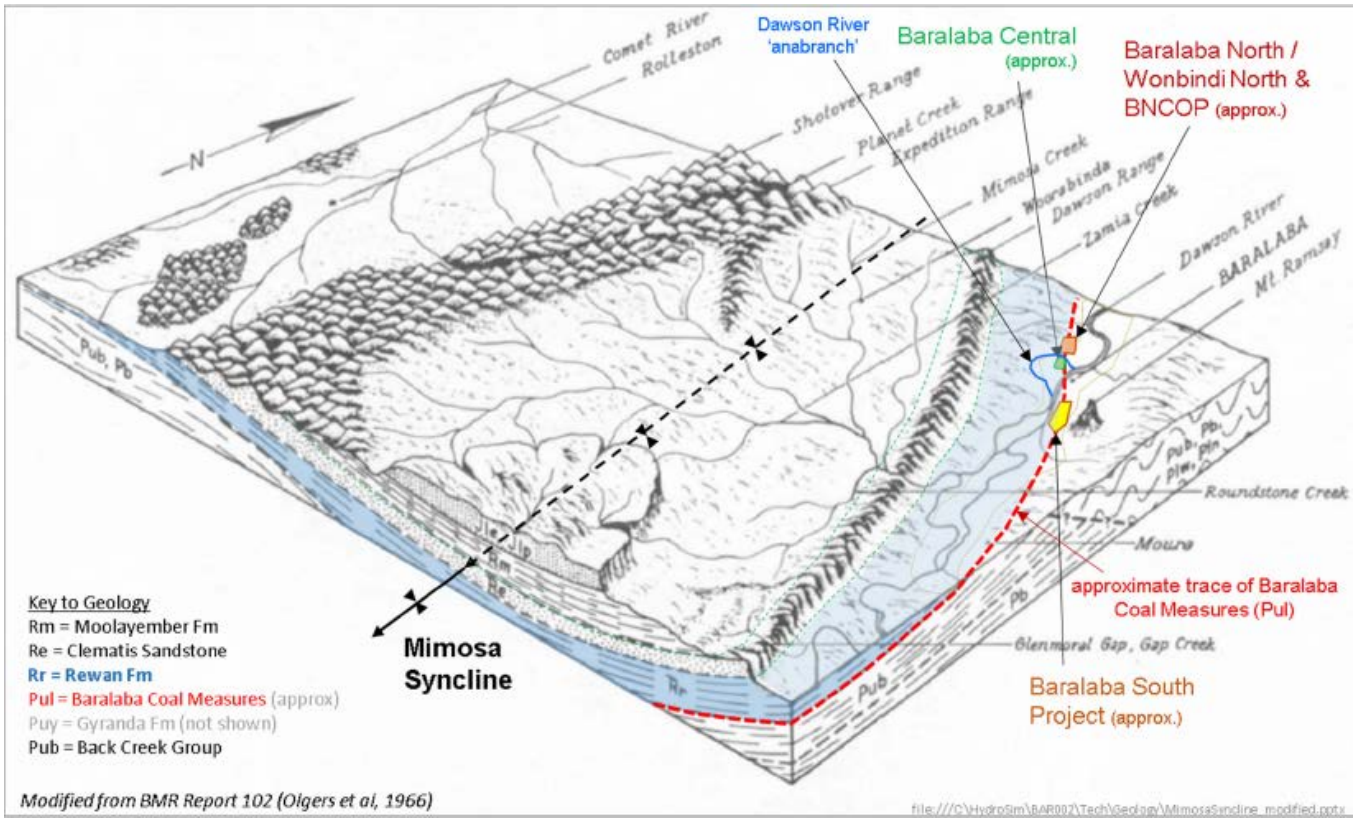
regolith, including alluvium and colluvium. The groundwater modelling and assessment in Appendix D of the EIS indicated the effect would be relatively small, and that 1m drawdown would extend about 2km further north-west along the strike of the coal measures, and between 1km and 1.5km further to the west within the colluvium.

Great Artesian Basin

The Clematis Sandstone is part the Eastern Recharge Zone of the Great Artesian Basin (GAB). The Clematis Sandstone outcrops as the Dawson Range about 10km to the west of the BNCOP. The Dawson Range is a prominent landscape feature of the eastern rim of the Mimosa Syncline, which lies to the west. The Rewan Formation outcrops or subcrops in the Dawson River valley beneath, and to the east of, the Dawson Range, and geologically dips underneath the Clematis Sandstone. The Rewan Formation acts as an aquitard that defines the base of the GAB in this area. The coal seams that are to be mined at the BNCOP subcrop to the east of Rewan Formation, and dip beneath it. The target coal seams are therefore separated from the GAB by the strata of the Rewan Formation as they dip into the Mimosa Syncline (Figure 5-5).

Because of the geological and hydrological separation of the GAB from the target coal seams, the BNCOP is not predicted to cause a change in flow direction in the hydrogeological units that constitute the GAB, or capture of groundwater from the GAB units. Therefore, the BNCOP would not cause any significant decline in the availability or levels of groundwater in the GAB.

Figure 5-5 Structural geology setting in the BNCOP area (Source: Figure 2-3 of Appendix D of the EIS)



Final void

Water would enter the final void from groundwater seepage and rainfall, but would be lost through evaporation. As part of the site water balance and surface water assessment, Appendix C of the EIS provided a final void water recovery analysis that included groundwater inflows from the groundwater model. The catchment of the final void would be made purposefully small by the placement of waste rock dumps. Inflows of groundwater and rainfall run-off under typical conditions would be significantly less than evaporation, and water recovery analysis concludes that a rainfall event of sufficient magnitude to cause the final void to overflow is very unlikely. Flooding from the Dawson River would not reach the final void up to, and including, the 1-in-1000-year flood event. However, a probable maximum flood in the upstream reach of the Dawson River to the south of the mine would have the potential to flow over a shallow ridge to the south of the final void, and from there run into the pit, possibly causing it to overflow at its northern end back into a lower, downstream reach of the Dawson River. Flushing of the pit in that manner could carry a slug of contaminated water into the river. This situation can be avoided by blocking the flow path into the pit by the strategic placement of waste rock across the ridge to raise it above the level of the probable maximum flood (see the Independent Expert Scientific Committee section below). The level of the probable maximum flood in the lower reaches of the Dawson River would not be high enough to enter the final void at its

northern end, so no protection is needed there.

Geomorphology

The risk of geomorphological impacts associated with the BNCOP is considered to be very low. The BNCOP does not interact with the Dawson River main channel flow, and only has a minor interaction with the floodplain or tributary flow for the 1-in-20-year and 1-in-100-year AEP design flood cases. It is expected that this interaction would be less or nil for the smaller, more regular flow events (i.e. 1-in-10-year and less). The locations of the interactions are in areas of low flood velocities in backwater areas of the floodplain. The BNCOP would cause negligible change in levels, directions and velocities of flood flows from existing conditions, and therefore the potential for floodplain erosion should not change from existing conditions.

Cumulative surface water impacts

Appendix C (Site water balance and surface water assessment) of the EIS provided an assessment of the cumulative water quality impacts of controlled releases associated with development of the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine, the BNCOP and the proposed Baralaba South Coal Project (BSCP), which is located 10km south of Baralaba. The results of the cumulative impacts assessment predict a negligible impact on the downstream water quality.

The cumulative flood-related impacts of the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine, the BNCOP and the BSCP were assessed in section 3.4.3 of the EIS, which concluded that potential impacts of the BSCP on flood levels dissipate well upstream of the existing Baralaba mines.

Cumulative groundwater impacts

The EIS provided an assessment of cumulative groundwater impacts on the predicted maximum cone of depression of the BNCOP in combination with the impacts of the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine and the potential impacts of the proposed Baralaba South Coal Mine. The results indicate that the predicted maximum cone of depression extends as follows:

- 2km to the west and north of the Baralaba North/BNCOP pit. Sensitivity analysis suggests that it may extend a little further northward along the strike of the Baralaba Coal Measures. However, it is not predicted to encroach to any appreciable extent into the Dawson River alluvium, nor would it reach the HES-S or HES-N wetlands
- around 1km east, west and south of the Baralaba Central pit
- 1km to 1.5km north, east and west of the mining pit at the proposed Baralaba South Project, but further, up to 2.5km to the south. However, it would not encroach into the Dawson River alluvium, and the drawdown due to the Baralaba South Project would not interfere or interact with the drawdown due to the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine, or the BNCOP

Cumulative drawdown impacts on registered bores adjacent to the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine and the BNCOP are predicted to be less than 0.5m, which would not result in a measurable loss of bore yield. Furthermore, none of the local registered bores within the area of predicted drawdown are currently used for groundwater extraction.

The Great Artisan Basin (GAB) groundwater resources would not be influenced by the predicted cumulative drawdown created by the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine, and the BNCOP. This is due to the distance between the mines and the Clematis Sandstone aquifer, and the significant intervening thickness of the low permeability Rewan Formation.

Proposed mitigation and management measures

Up-Catchment diversions and controlled releases

The proponent would construct a series of 1-in-1000-year AEP flood protection levee banks to prevent up-catchment run-off water from entering the open-cut mining area. Controlled releases would be undertaken in accordance with the release limits and release rates specified in the project EA.

Water licensing

The proponent currently holds 500ML of volumetric licence water allocation from the Dawson River. The existing water licence allocation of 500ML would meet all site water demands:

- for the first 5 years of operations
- in more than 90% of modelled realisations for Years 6, 7, 10, 11 and 12 of the BNCOP
- in more than 75% of modelled realisations for the remaining years.

If required, additional water licences would be sought and purchased by the proponent over the life of the BNCOP to meet raw water demands.

Groundwater licensing is not required due to the BNCOP's location outside any groundwater management areas identified by the Water Resource (Fitzroy Basin) Plan 2011 of the Fitzroy Basin Water Resource Plan.

Adaptive management

Over the life of the BNCOP, there would be numerous options for adaptive management of the mine water management system to accommodate changing climatic conditions. For example, temporary adjustments to pumping arrangements could be made to accommodate very wet or dry periods. The alternative management approaches that could be used to reduce the risks associated with climatic variability include:

- advanced dewatering within the proposed open cut pit
- use of chemical or other dust suppressants to reduce the amount of water required for dust suppression.

Acid rock drainage management

Spoil from overburden removal and coarse rejects and slimes produced at the CHPP would be managed as follows:

- highly weathered or friable overburden would not be used on the surface of rehabilitated landforms
- coarse rejects and slimes would be co-disposed with spoil in the Baralaba Coal Mine void, or behind the advancing open-cut operations in the Baralaba North pit.

Coarse rejects and slimes disposed into the pit would be placed below the expected final landform groundwater level and buried by at least 5m of benign spoil within one month of placement.

Receiving environment monitoring program

The Baralaba Coal Mine receiving environment monitoring program (REMP) would be reviewed and revised to incorporate the BNCOP and would:

- assess the condition or state of receiving waters, including upstream conditions, spatially within the REMP area, considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality)
- be designed to facilitate assessment against WQOs for the relevant environmental values that need to be protected
- include monitoring from background reference sites (e.g. upstream) and downstream sites from the release
- specify the frequency and timing of sampling required in order to reliably assess ambient conditions and to provide sufficient data to derive site specific background reference values in accordance with the Queensland Water Quality Guidelines
- include monitoring during periods of natural flow irrespective of mine or other discharges
- include monitoring and assessment of dissolved oxygen saturation, temperature and all water quality parameters listed in the controlled release criteria
- include, where appropriate, monitoring of metals and metalloids in sediments in accordance with Australian and New Zealand guidelines for fresh and marine water quality (ANZECC and ARMCANZ, 2000), and/or the most recent version of AS5667.1: Guidance on Sampling of Bottom Sediments)
- include, where appropriate, monitoring of macroinvertebrates in accordance with the AusRivas methodology
- describe sampling and analysis methods and quality assurance and control
- incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

Groundwater monitoring

The existing groundwater monitoring program would be expanded with additional monitoring bores for the BNCOP. In addition to the monitoring sites installed for the groundwater investigation program, the existing groundwater monitoring network would be augmented with investigative drilling in the North-west Soak. If the geology encountered is suitable, multi-level piezometers would be installed to monitor any potential water level changes at the North-west Soak in response to mining.

An investigation would be undertaken in the event that trigger levels described in the EA are exceeded, or groundwater fluctuations are detected in excess of 2m per year beyond predictable seasonal fluctuations.

If a more than negligible impact on water levels in the Northern Wetland was to be identified, potential management measures would include, but not necessarily be limited to:

- interception of direct groundwater inflows from alluvium (or surficial unconsolidated sediments) exposed in the highwall of the open cut prior to it reaching the floor of the open cut and pumping back to the nearest creek/water body (achieved by the installation of sumps and a pump/pipe system on a bench of the open cut)
- sealing the intersected alluvium by selective placement of more weathered material, sourced from pre-stripping operations (e.g. placement and compaction of clay-rich material in thin layers).

Water management plan

The Baralaba Coal Mine water management plan would be reviewed and revised in accordance with the EHP guideline, Preparation of water management plans for mining activities, to incorporate the BNCOP, including:

- a study of the source of contaminants
- a water balance model for the BNCOP
- a water management system for the BNCOP
- measures to manage and prevent saline drainage
- measures to manage and prevent acid rock drainage
- contingency procedures for emergencies
- a program for monitoring and review of the effectiveness of the water management plan.

The water management plan would be reviewed annually by an appropriately qualified person and assessed against the requirements of the EA. A review report would be prepared that includes recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year and identify any amendments required to the water management plan.

Water management system

The BNCOP water management system would maintain separation between run-off from areas undisturbed by mining and water generated within active mining areas. The water management system would include a combination of permanent structures (e.g. erosion protection levees) that would continue to operate after mining is completed, and temporary structures that would only be required until the completion of the rehabilitation works (e.g. diversions and sediment dams).

Consistent with current best practice in mine water management, the proponent has committed to further investigate the potential options and proposed approach for on-site separation of waters with different quality as part of the detailed design of the water management system. The investigation would be undertaken if the controlled release rules were to significantly restrict opportunities to discharge to the Dawson River. The system would be refined as necessary during the life of the BNCOP.

During detailed design of the mining industrial area (MIA) and associated water management system, the proponent has also committed to consider adopting a more stringent sediment dam design criteria and/or altering the operating rules (e.g. pump all collected runoff to the mine water dam) to reduce the risk of potential overflows from sediment dams containing runoff from the MIA.

Groundwater monitoring and management program

The Baralaba Coal Mine groundwater monitoring and management program would be reviewed and revised to incorporate the mining activities associated with the BNCOP. After revision, the program would:

- be able to detect a significant change to groundwater quality values due to activities associated with the BNCOP
- include measures to minimise the impact of the BNCOP on groundwater resources
- include contingency procedures for emergencies
- include performance measures for monitoring and review of the effectiveness of the groundwater monitoring and management program.

Independent Expert Scientific Committee (IESC)

When considering the IESC advice, EHP sought assistance from other government departments, including DNRM and the Department of Science, Information Technology, Innovation and the Arts. The IESC provided advice in response to a number of questions in the joint request for advice prepared by DOTE and EHP. The IESC advice on the EIS for the BNCOP is available on the IESC website (www.iesc.environment.gov.au/advice/proposals.html). The proponent responded to this advice on pages 38 to 63 of the Supplementary Report and in its Attachment A (August 2014). Attachment A of the Supplementary Report included amendments to Appendix C (Site Water Balance and Surface Water Assessment) and Appendix D (Groundwater Modelling Assessment) of the EIS. The major issues raised in the IESC's advice and the proponent's response to the advice are summarised below.

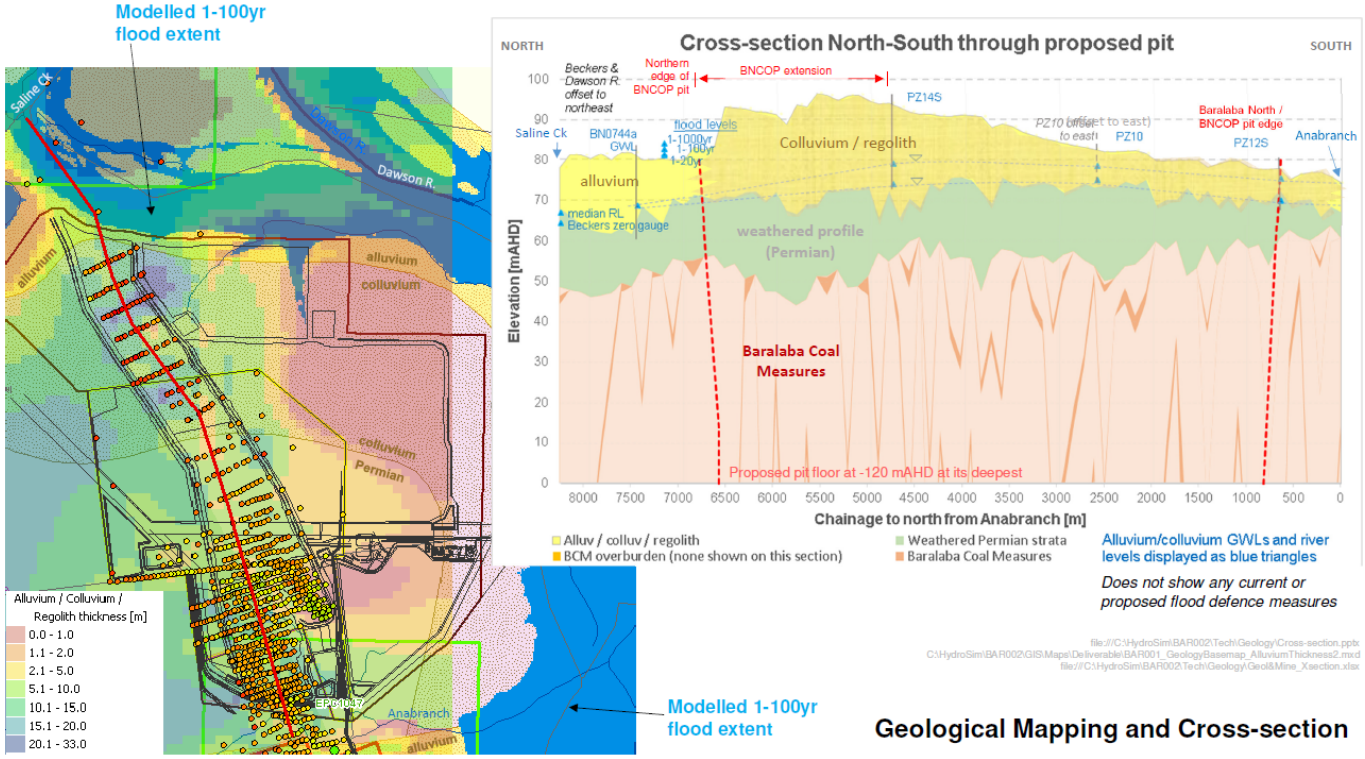
IESC issue 1
The extent the pit may penetrate the alluvium is uncertain.

Proponent's response to issue 1

In response to issue 1, the proponent explained that the extent of the unconsolidated and weathered deposits in the vicinity of the BNCOP has been determined using a combination of regional scale mapping, floodplain mapping, local-scale geological modelling developed for mine planning (generated from geological logs) and the transient electromagnetic (TEM) survey, which included mapping of the alluvium immediately to the north of the BNCOP area. The results of the TEM survey were also used to interpret the extent of fresh and saline groundwater surrounding the BNCOP area. This information was used to define the extent and thickness of alluvium, colluvium and regolith above the Permian strata, as well as the geometry and property distributions in Appendix D (Groundwater Modelling and Assessment) of the EIS.

The proponent also referred to a geological cross-section in Attachment A of the Supplementary Report (Figure 5-6) which shows the thickness and extent of the alluvium, colluvium and other regolith throughout the BNCOP area. The cross-section also shows measured groundwater levels in the surficial sediments, measured or modelled river levels and flood levels. As shown on the geological cross-section, and given the significant unsaturated depth in the surficial deposits (supported by the results of the TEM survey at the proposed pit extent), the information shows with a reasonable degree of certainty that the extent of the pit would not significantly penetrate the alluvium.

Figure 5-6 Geological cross-section of the BNCOP pit (Source: Attachment A, Supplementary Report)



IESC issue 2

The degree of interaction between surface water and groundwater is uncertain.

Proponent's response to issue 2

In response to issue 2, the proponent referred to a mass balance that was undertaken which validates the groundwater-surface water interaction assumptions made in the EIS. The mass balance produced a best estimate baseflow index of 1.1% of flow, with a maximum of about 3%. This is consistent with Appendix D of the EIS which concluded that the Dawson River does not receive much baseflow around Baralaba and there is no appreciable contribution from groundwater in the sediments to the north. Furthermore, the available topographic detail, geological cross-sections, groundwater and surface water monitoring data, modelling of the regional groundwater table, mapping of wetlands, vegetation and potential GDEs in the vicinity of the BNCOP, shows with a reasonable degree of certainty that the interaction between surface water and groundwater is limited.

IESC issue 3

The likelihood of river erosion that may result in realignment of the Dawson River through the pit or final void is uncertain due to the lack of a geomorphologic assessment.

Proponent's response to issue 3

The likelihood that the BNCOP would result in realignment of the Dawson River through the pit or final void can be reduced to the point that the risk is negligible.

In response to issue 3, the proponent referred to a geomorphology assessment in Attachment A of the Supplementary Report (August 2014), which concluded that the BNCOP does not interact with the Dawson River main channel flow and only has minor interaction with the floodplain or tributary flow for the AEP 1-in-20-year and 1-in-100-year floods, and even less interaction for the AEP 1-in-10-year flood or smaller. Further, the interactions are predicted in low flow velocity areas of the floodplain, and would not change the existing levels and velocities. Therefore, the potential for floodplain erosion in general is not expected to change from existing conditions.

The cumulative impact assessment of the BNCOP and Baralaba South Coal Project (BSCP) found that the impact of the BSCP dissipates well upstream of the BNCOP, and therefore, there are no cumulative effects.

The flood model mining case for the 1-in-50-year AEP event found there would be minimal impact on velocities, bed shear stress and stream power, which are the key indicators of erosion and geomorphological change. The predicted levels are well below the maximum allowable limits for a 1-in-50-year AEP event specified in the Australian Coal Association Research Program (ACARP) for Bowen Basin river diversions – design and rehabilitation criteria (July 2002). The BNCOP final landform case for a 1-in-50-year AEP event showed a reduction in velocities, bed shear stress and stream power between the two levee banks near the Baralaba central pit, which is likely caused by the widening of the anabranch corridor. The predicted levels are also well below the maximum allowable ACARP limits for a 1-in-50-year AEP event. Consequently, it is considered unlikely that the operating mine or final landform design would cause significant impact on the geomorphological stability of the Dawson River and anabranch.

A review of historical aerial photos suggests that lateral erosion of the Dawson River is slow and would occur over hundreds, perhaps thousands of years. Furthermore, the influence of the Neville Hewitt Weir on flows would limit lateral movement of the river towards the anabranch, and works would be undertaken by the proponent to limit lateral movement, if erosion was identified in the future. Consequently, the risk of geomorphological impacts of the BNCOP is considered to be very low.

Ongoing monitoring in the alluvium and monitoring to identify changes in wetland water levels would be undertaken and mitigation measures implemented to manage any identified impacts.

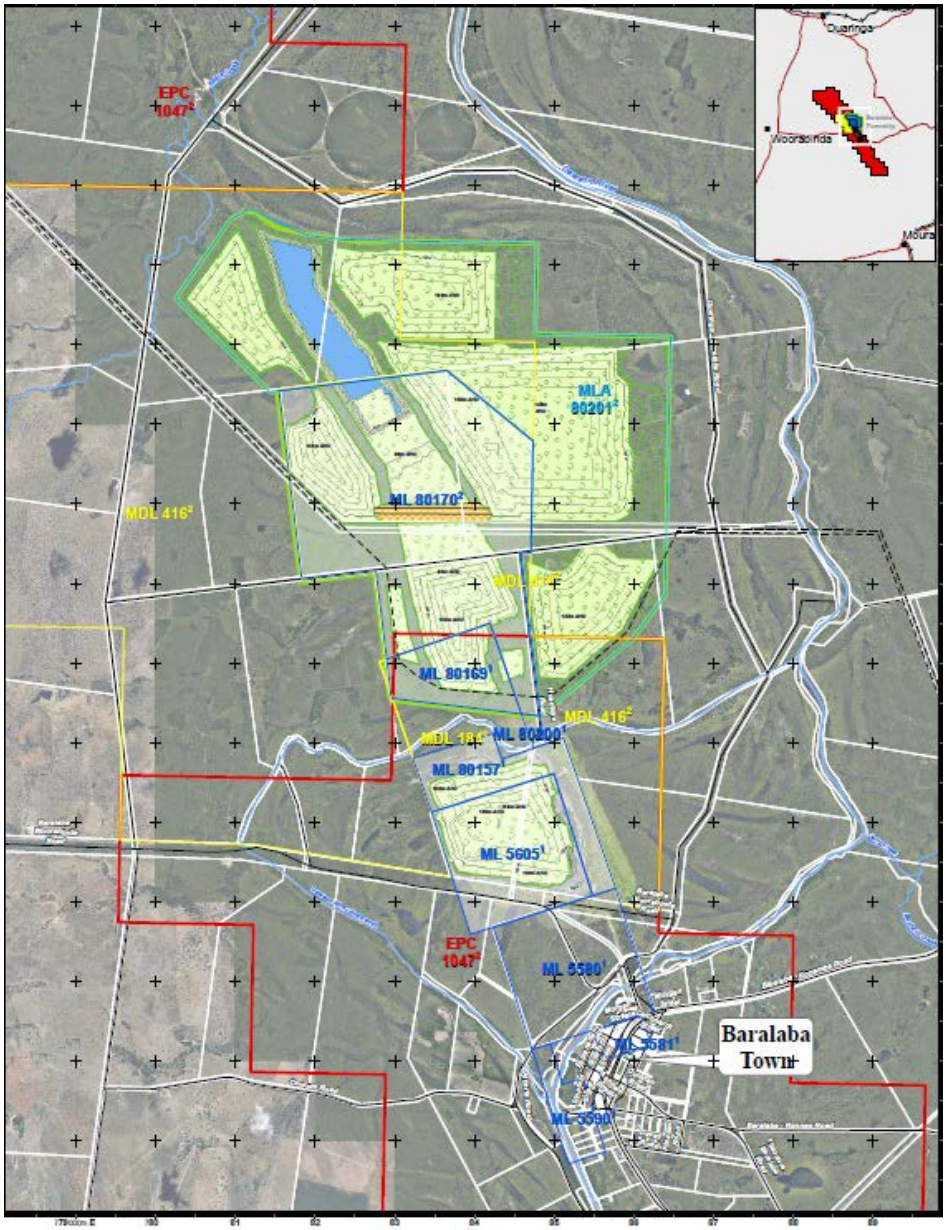
After responding to the IESC advice, the proponent reviewed the mine plan and committed to protecting the final void from filling and flushing during flood events up to, and including, the probable maximum flood (PMF) level. This outcome would be achieved by constructing significant, additional earthworks that would increase the flood protection of the final void above the level of the probable maximum flood.

Figure C.4 of Appendix F (Flood Modelling and Assessment) of the EIS, showed that there is a low ridge that runs roughly west-east between two spoil dumps, and that ridge would separate the southern end of the final void from floodwaters. The flood protection of the final void landform as it was shown in the EIS would protect the pit from being inundated up to the 1-in-1000-year ARI flood level. However, Figure C.5 of Appendix F showed that the pit would be inundated in a probable maximum flood event, because flood waters would spill over the ridge, fill the pit from its southern end, then cascade at two points on the northern edge of the pit down an incline approximately 3m in height into the Northern Wetland and Saline Creek.

Due to the height of the northern edge of the pit, floodwaters would never enter the northern end of the pit from the Northern Wetland or Saline Creek. Therefore, it would only be necessary to block off the southern end of the final void to achieve protection of the final void landform from floods up to, and including, the probable maximum flood.

To achieve this final landform design, the mine plan will be amended so that as the pit is being progressively backfilled, it will be over-filled at the position of the existing ridge between the two spoil dumps to a height above the probable maximum flood level. The final landform would be designed to form a broad ridge with gentle, erosion-resistant slopes. During mine closure, spoil would be used to block off any access roads to the pit to complete the ridge and achieve probable maximum flood immunity between the two spoil dumps (see Figure 5-7 below). The final void landform would be shaped and rehabilitated to achieve the final landform design criteria, rehabilitation goals and completion criteria specified in section 6.2.6 of the EIS. Flood modelling also showed that flow velocities against this built-up ridgeline would be very low, reducing the possibility of erosion. This measure would create a final void landform with very long-term stability following the completion of mining, and reduce the likelihood of realignment of the Dawson River through the final void to a negligible level in the foreseeable future.

Figure 5-7 Revised final void landform design to achieve PMF immunity of the final void (Source: adapted from Figure C.4 of Appendix D of the submitted EIS)



IESC issue 4

The potential ecological impacts of the BNCOP remain uncertain due to a lack of ecological data and information, and insufficient attribute based ecological risk assessment with which to compare the pre-mining, mining and final landform environmental conditions. This information would help better understand the risks to water-related assets and the adequacy of proposed mitigation and management measures. Further, cumulative impacts on the ecology have not been sufficiently addressed, due to the limited data and understanding.

Proponent's response to issue 4

In response to issue 4, the proponent referred to Appendices A (Terrestrial ecology assessment) and B (Aquatic ecology assessment) and section 3.1.2 of the EIS, which describe the ecological monitoring data that was collected in accordance with relevant state and Commonwealth survey guidelines. Seasonal (twice per year) terrestrial and aquatic ecology surveys were carried out during 2013 as described in Section 3.1.2 of the EIS. Aquatic ecology surveys comprised an assessment of aquatic habitat condition, water quality sampling, as well as sampling and habitat assessment for aquatic flora, fish, crustaceans, macro-invertebrates and turtles. Targeted searches for threatened fauna species listed under the *Fisheries Act 1994* and EPBC Act were also conducted. Further, Appendices A and B and section 3.1.3 of the EIS discussed the potential impacts of the project on the ecological values within and surrounding the project, taking into account the ecological attributes relevant to the BNCOP (i.e. structure, composition, interactions and abiotic and biotic processes). The ecological data and survey information and attribute based ecological risk assessment presented in the EIS shows with a reasonable degree of certainty what the potential ecological impacts of the project would be during its various stages. With regard to potential cumulative impacts on ecology and water quality, the proponent concluded that:

- the vegetation communities to be cleared for the BNCOP occur more widely in surrounding areas
- the proposed vegetation clearance equates to between 0.02% to 0.6% of the extant remnant regional ecosystems in the combined Dawson River Downs and Woorabinda IBRA sub-regions, which bisect the BNCOP area
- negligible cumulative impact is likely on downstream water quality in combination with the BSCP.

IESC issue 5

Due to the location of the BNCOP on the Dawson River floodplain, key surface water risks include pit inundation during extreme flood events, potential loss of levees and pit wall failure.

Proponent's response to issue 5

In response to issue 5, the proponent referred to Section 3.4 and Appendix F of the EIS, which outlines the potential risk of flood events associated with the BNCOP, and Section 2.4 of the EIS which discusses the construction of levees and spoil dumps to provide adequate flood immunity from flood events. The proponent also referred to section 3.4.3 of the EIS, which identified that the BNCOP would excise part of the Dawson River floodplain and acknowledged that this has the potential to increase flood levels in the vicinity of the project. However, the proponent referred to the flood assessment in Appendix F which considered the risk of changes in flood levels and velocities on the project and concluded that water would not enter the final void during flood events up to the 1-in-1000-year annual exceedence probability (AEP) event. The proponent also stated that the peer review of Appendix F found that the study methodology and level of detail in reporting was appropriate for the purpose of assessing the impacts of the project on Dawson River flooding and adequately addressed the requirements of the final TOR.

Furthermore, since responding to the IESC advice (as noted above with regard to issue 3) the proponent has reviewed the mine plan and committed to protecting the final void from filling and flushing during flood events up to, and including, the probable maximum flood (PMF) level.

IESC issue 6

There are uncertainties for pit groundwater inflows, which could impact on the performance of the mine water management system.

Proponent's response to issue 6

In response to issue 6, the proponent referred to the peer reviews of Appendices C (Site Water Balance and Surface Water Assessment) and D (Groundwater Modelling and Assessment) of the EIS, which concluded that the surface water and groundwater assessments contained sufficient information to assess the impacts of the project and adequately addressed the requirements of the final TOR. The proponent also included a summary of groundwater modelling key assumptions and limitations in Attachment A of the Supplementary Report (August 2014). The proponent also identified that residual groundwater uncertainties could be considered in any future review of the groundwater model over the life of the BNCOP.

IESC issue 7

No field investigation was conducted into the groundwater dependency of the wetlands or terrestrial vegetation communities identified along the Dawson River and on the floodplain. As a result, the potential impacts of the BNCOP on groundwater dependent ecosystems (GDEs) are uncertain.

Proponent's response to issue 7

In response to issue 7, the proponent referred to section 3.1.2 of the EIS, which states that groundwater in the area of the BNCOP is generally greater than 5m below surface, and therefore too deep for terrestrial vegetation to access. The regional water table is less than 5m in riparian areas along the Dawson River and the Dawson River Anabranch. Appendix A concludes that the riparian woodland vegetation is likely to be dependent on high water availability in the alluvium soils. While the groundwater baseflow may sustain the riparian vegetation in addition to surface water inflows, Appendix D indicates that the baseflow contribution to watercourses is small.

With regard to impacts on GDEs, Appendix D concludes that baseflow contributions to downstream features would be limited and there would be no measurable changes in the quality of groundwater as a result of mining. Appendix A also states that as no measurable impacts on surface water quantity or quality are likely from changes in groundwater (e.g. drawdown), no adverse impacts are likely to occur on surrounding habitats that use groundwater such as riparian vegetation on the Dawson River and Dawson River Anabranch. Furthermore, section 3.3.2 of the EIS states that the North-west Soak and the Northern Wetland occur due to perched water tables that develop after rain or flood events and are unlikely to be dependent on, or connected to, the regional groundwater table.

The proponent also referred to the peer reviews, which found that the relevant appendices met the state and Commonwealth requirements, as well as the requirements of the final TOR. It therefore appears that sufficient assessment has been made of the potential impacts of the BNCOP on groundwater dependent ecosystems.

IESC issue 8

There is inadequate assessment and understanding of stygofauna communities to adequately identify risks arising from the BNCOP.

Proponent's response to issue 8

In response to issue 8, the proponent referred to section 1.2 of the stygofauna assessment in Appendix P of the EIS, which was conducted according to best practice sampling and survey methods. Furthermore, the groundwater assessment predicted no measurable changes in the quality of the Permian, alluvial or colluvial groundwater as a result of the BNCOP. Furthermore, the proponent determined that identification of stygofauna to the species level is not required, because the BNCOP is unlikely to impact on habitat suitability, or influence the composition of stygofauna communities.

IESC issue 9

Monitoring of site water demands, catchment runoff and groundwater inflows for quantity and quality should be undertaken during mine operations to allow for calibration of the water balance model and evaluation of the adequacy of the mine water management system.

Proponent's response to issue 9

In response to issue 9, the proponent referred to their commitment in section 3.2.4 of the EIS to expand water quality monitoring sites to include the new water storages for the BNCOP. Further, the proponent referred to their commitment in Appendix C to further investigate the options for separating waters with different water quality during the detailed design of the water management system and refine these measures during the mine life. The proponent also referred to the peer review of the site water balance and surface water assessment in Appendix C, which were found to address the requirements of the final TOR.

IESC issue 10

Greater differentiation in management of different water quality in runoff collected by sediment dams on-site is required to provide greater assurance that water quality in the Dawson River will be maintained.

Proponent's response to issue 10

In response to issue 10, the proponent referred to section 3.2.3 of the EIS, which concluded that water quality in sediment dam overflows should have low salinity and be of similar quality to the surrounding undisturbed catchments and would not impact on receiving water quality. The proponent also referred to their commitment in Appendix C of the EIS to pump all runoff collected in sediment dams to the mine water dam to reduce the risk of overflow.

EHP also notes that its regulation of water at mine sites would require that water directed through sediment dams would only be contaminated by sediment from disturbed areas. Any water that may have additional contamination from operations at the mine would be categorised as mine affected water and directed into regulated structures that have more stringent operating conditions than sediment dams.

IESC issue 11

Updating the modelling following flood events would allow for validation of predictions and improve confidence in results. Monitoring should include flood levels, timing, extent of inundation and observed impacts.

Proponent's response to issue 11

In response to issue 11, the proponent stated that the flood model in Appendix F of the EIS was verified against a range of recorded data for the large December 2010 flood event. In the event of larger flood events during the life of the BNCOP, the proponent committed to validating the model results against future measured flood levels. The proponent also referred to the peer review of Appendix F, which concluded that the study methodology and level of detail in reporting was appropriate for assessing the flood related impacts of the project and adequately addressed the requirements of the final TOR.

IESC issue 12

Insufficient data has been presented to demonstrate that, apart from the BSCP, no other projects (i.e. Dawson and Moura mines) or activities could contribute to cumulative impacts in the Dawson River. Furthermore, only preliminary flood modelling is available for the BSCP and the BNCOP flood model extent does not include the BSCP. Consequently, there remains uncertainty regarding the cumulative flood impacts of these projects.

Proponent's response to issue 12

In response to issue 12, the proponent referred to the results of the water balance model which indicates that there will be an average of approximately 150 release days over the 15 year project life. Therefore, given that 97% of the time there will be no releases (and hence no impacts), the risk of significant cumulative impacts, which would require measurable impacts from other projects on the same days, is very low.

Section 9.4 of Appendix C was updated in the Supplementary Report to include information about the predicted water quality of discharges from the BNCOP and the potential impacts of any discharges and concluded that nearly all of the water quality objectives (WQOs) for discharges would be met, and for the remaining few parameters that exceeded the WQOs, the exceedences would be due to existing background levels.

With regard to cumulative impacts with the BSCP, the proponent referred to section 3.4.3 of the EIS which states that potential impacts of the BSCP on flood levels dissipate well upstream of the existing Baralaba mines. The proponent acknowledged that the EIS for the BSCP would require detailed flood modelling and consideration of cumulative impacts.

The proponent also referred to the peer review, which concluded that the study methodology and level of detail in reporting was appropriate for assessing the flood related impacts of the project and adequately addressed the requirements of the final TOR.

IESC issue 13

Refinements to the groundwater model should incorporate data from existing operations, and uncertainty in predictions should be quantified through ongoing data collection and use of independent estimates to validate calibrated values.

Proponent's response to issue 13

In response to issue 13, the proponent referred to the hydrographs in Figures 3-5 and 3-6 of Appendix D of the EIS and stated that the groundwater model was parameterised considering data from local permeability testing, and was calibrated against mining-affected groundwater levels from around the Baralaba Coal Mine, and could be used to estimate groundwater inflows at Baralaba Central.

The proponent also referred to the peer review of Appendix D (Groundwater Modelling and Assessment), which found the model suitable for assessing the influence of continued mining on the groundwater system.

IESC issue 14

A risk assessment framework including hazard identification needs to be developed in order to determine additional measures and commitments required to mitigate and manage impacts to surface water.

Proponent's response to issue 14

In response to issue 14, the proponent referred to section 3.4.5 of the EIS, which includes a detailed risk based assessment of all regulated dams in accordance with the Manual for Assessing Consequence Categories and

Hydraulic Performance of Structures Version 3.1 (DEHP, 2013). The assessment involved assigning a significance category to each regulated dam based on the potential for the dam to fail and in consideration of the downstream consequences of any failure. All regulated dams that were classified as a "significant" or "high" consequence category were assessed against the requirements for a design storage allowance. Importantly, the design storage allowance for the BNCOP is based on the integrated containment system functioning as a whole and includes a design simulation margin of 50% (i.e. the design storage allowance has been increased by 50% as no data is available for calibration of the site water balance model). The assessment concluded that there is a less than 5% chance of the mine water dam inventory exceeding 555ML on 1 November of each year of the mine life (i.e. not meeting the design storage allowance volume of 645ML).

IESC issue 15

Specific measures to manage impacts to water-related assets, including setting of trigger levels for water level and quality in relevant aquifers (e.g. Quaternary, Tertiary and Permian strata) and establishment of drawdown buffer zones around GDEs within the area based on field investigation and monitoring data would be beneficial to avoid impacts from groundwater extraction.

Proponent's response to issue 15

In response to issue 15, the proponent referred to the establishment and implementation of water level and quality triggers in the proposed EA conditions in section 6.2.3 of the EIS. The proponent stated that the establishment of drawdown buffer zones is not warranted for GDEs due to the outcomes in section 3.3.2 of the EIS which found that the North-west Soak and the Northern Wetland occur due to perched water tables that develop after rain or flood events and are unlikely to be dependent on, or connected to, the regional groundwater table.

Major issues raised in submissions

Surface water

EHP requested the proponent to use the metals, metalloids and other toxicant WQOs trigger values for 95% species protection for slightly to moderately disturbed systems specified in the ANCECC and ARMCANZ (2000) guidelines, instead of the WQOs for stock watering and irrigation. In response, the proponent stated that the WQOs for stock watering and irrigation were selected in the absence of specified WQOs for aquatic ecosystem protection.

EHP believes that the proponent has overlooked the trigger values for metals, metalloids and other toxicants specified for slightly to moderately disturbed systems in Table 3.4.1 of the ANZECC and ARMCANZ (2000) guidelines. Consequently, in the absence of sufficient locally relevant water quality data to derive site-specific WQOs, the trigger values specified in the ANZECC and ARMCANZ (2000) guidelines have been used to develop the contaminant trigger investigation levels for the recommended conditions of the draft EA for the project included in Appendix 1 of this report.

EHP requested the proponent to update proposed Condition A3 (WN) in section 6.2.1 of the EIS to include a 200m area of exclusion of mining activities buffer between mining activities and the Northern Wetland. In response, the proponent committed to amend Condition A3 (WN) to include a minimum 100m buffer between mining activities and the Northern Wetland. The proponent referred to the groundwater assessment in Appendix D of the EIS which determined that the Northern Wetland exists due to a perched water table that persists after rainfall and is unlikely to be dependent on, or connected to, the regional groundwater table. Consequently, it argued, the drawdown associated with mining would be unlikely to impact on the environmental values of the Northern Wetland. Further, the proponent proposed to monitor water levels and quality in the Northern Wetland, and if required, implement the following management measures:

- intercept groundwater inflows from the alluvium in the open-cut pit and pump it back to the nearest watercourse
- selective placement and compaction of pre-stripped weathered material against the alluvium to create a low permeability seal.

EHP subsequently conducted a site inspection of the Northern Wetland to gain a better understanding of the environmental values and footprint of the wetland in relation to the proposed mining activities. During the inspection it was noted that there is a rapid transition from the wetland area to the dry terrestrial regime, and there was no evidence (e.g. yabby holes, aquatic flora etc.) to suggest an important link exists between the wetland and the wetland support area (buffer). Consequently, EHP is satisfied that the 100m buffer between the wetland footprint and the mining activities, as well as the commitments to monitor water levels and quality and to manage any significant changes, will be adequate to protect the environmental values of the Northern Wetland.

EHP requested the proponent to provide information about the analytical methodologies and detection levels used for background surface water quality monitoring. In response, the proponent amended Appendix C of the EIS to include information about the limits of reporting (LOR) and the analytical methodologies used for the Cockatoo Coal and EHP background surface water quality monitoring results in the EIS. EHP was satisfied with the information

provided by the proponent.

EHP requested the proponent to provide detailed information about the site water management infrastructure. In response, the proponent referred to Appendix C of the EIS, which contains detailed information about the locations, names, dimensions, storage capacities, staging, functions and interactions of the proposed site water management infrastructure. EHP deemed the information adequate for the purposes of understanding how the proponent proposes to manage water on-site and for preparing recommended draft EA conditions for the project.

EHP requested the proponent to describe the project activities and the potential impacts of the activities on surface water quality and quantity, as well as proposed management and mitigation measures. In response, the proponent referred to Table 10-2 that was included in the Supplementary Report (August 2014). The new table provided a summary of development activities during the various phases of the project, as well as the potential impacts on water resources and the proposed mitigation and management measures. The proponent committed to implementing the mitigation and management measures through the erosion and sediment control plan and water management plan. EHP was satisfied that the proponent has shown how the potential impacts of the project on water quality and quantity would be mitigated and managed.

EHP requested the proponent to provide information about the predicted water quality of discharges from the project and the potential impacts of any discharges on water quality, including impacts on the assimilative capacity of the receiving environment. In response, the proponent included the information requested in Appendix A of the Supplementary Report. The key findings are discussed in section 5.10.3 of this report and the information is adequate for EHP to develop water monitoring conditions for the draft EA.

EHP requested the proponent to relocate the proposed upstream monitoring location on the Dawson River Anabranch further upstream to prevent any mixing with any discharges during low, or no, flow conditions. In response, the proponent provided the coordinates of the revised upstream monitoring location and showed the new location on a suitable map. EHP is of the opinion that the revised monitoring location is now located a sufficient distance upstream of the proposed discharge point to prevent any mixing.

EHP requested the proponent to provide information about the flow conditions under which the surface water quality samples were collected to derive locally relevant WQOs. In response, the proponent committed to use the default WQOs, until sufficient background data can be gathered to derive locally relevant WQOs. Consequently, EHP has used the default WQOs to derive the discharge limits in the recommended draft EA conditions.

DAFF requested the proponent to consult about waterway barrier works approvals required for the project. In response, the proponent referred to section 3.1.3 of the EIS, which states that no waterway crossings (barriers) are proposed within the BNCOP area. However, consultation with DAFF would be undertaken in the future, if waterway barrier works were required. Given that the proponent does not propose any waterway barrier works, EHP is satisfied with the proponent's response.

Groundwater

DOTE requested the proponent to provide information on hydraulic conductivity for the coal seams, the alluvium and the colluvium, and to explain how the data was used in the groundwater model. In response, the proponent referred to Table 2-8 of Appendix D of the EIS, which contains the hydraulic properties of coal seams, alluvium and quaternary aged materials (including colluviums) from previous studies in the Bowen Basin that were adopted for the groundwater model. The proponent later confirmed with EHP that apart from the coal seam, alluvium and colluvium information from previous Bowen Basin studies, site specific hydraulic conductivity data generated from falling head and slug tests were also used to develop and calibrate the modelled hydraulic properties for the groundwater model (refer to Table 3-3 of Appendix D of the EIS). The Department of the Environment did not raise any further issues.

DNRM requested the proponent to undertake an on-ground field survey to determine the number and location of existing groundwater bores located within the area of predicted groundwater drawdown, and DAFF requested the proponent to provide a detailed mitigation strategy for agricultural bores that would experience drawdown as a result of mining activities. In response, the proponent stated that consultation with potentially affected landholders has confirmed that there are no groundwater bores being used within the area of predicted drawdown, largely due to the high salinity levels, which makes the groundwater unsuitable for agricultural and domestic uses. No further issues were raised by DNRM or DAFF in regard to this issue, and EHP is of the opinion that in the absence of evidence of significant groundwater use in the area, a groundwater bore field survey and a detailed mitigation strategy would not be required for the project.

DNRM requested further information about how the relationship between surface water in the Dawson River anabranch and the underlying groundwater aquifers had been considered in the groundwater modelling. In response, the proponent referred to the site water balance and surface water assessment in Appendix C of the EIS, which found that the Dawson River Anabranch is elevated slightly compared to the Dawson River, collects run-off from the local catchment and receives overflows from the Dawson River during floods. Consequently, the

anabranch does not flow continuously, and after a period of heavy rain and overflow from the Dawson River, water levels recede to form a series of ponds that also recede to leave a dry channel. With regard to groundwater modelling, the proponent stated that the key difference between the Dawson River and the anabranch is the relative persistence of flow. The regulated Dawson River at Beckers Road flows around 65% of the time. However, overflow into the anabranch occurs less frequently. The relativity of local groundwater levels compared to river levels, in and around Baralaba, results in the Dawson River, and the slightly more elevated anabranch, losing water to the underlying groundwater system. The Dawson River and upstream reaches of the anabranch were modelled using MODFLOW River boundaries that are allowed to lose and gain flow. The downstream reaches of the anabranch were conservatively set to gaining only, as it flows only infrequently along most of its length and using river boundaries that are allowed to lose flow may overplay its role as a potential source of recharge to the underlying groundwater system. DNRM was satisfied with the additional information and did not raise any additional issues in this regard.

DNRM also requested further information about how the varying depth of water in the Dawson River upstream and downstream of the Neville Hewitt Weir was considered in the groundwater modelling. In response, the proponent referred to section 3.5.2 of the site water balance and surface water assessment in Appendix C of the EIS, which explains that river cells downstream of Neville Hewitt Weir were applied at the corresponding elevation in a digital elevation model. All river cells upstream of Neville Hewitt Weir with an elevation of less than 79m AHD were overwritten with a stage of 79m AHD to represent ponding behind the weir. DNRM was satisfied with the additional information and did not raise any further issues on this subject.

DNRM requested the proponent to include actual rainfall data up to and including the January 2013 event on the hydrographs used in the groundwater assessment in Appendix D of the EIS, as well as a description of how the January 2013 rainfall event had been considered in the groundwater modelling. In response, the proponent provided updated hydrographs with the requested rainfall data in Attachment A of the Supplementary Report. The proponent also stated that the state of watercourses in the area was modified to represent flooding for the much larger December 2010/January 2011 flood event, but was not deemed necessary for the January 2013 event for the following reasons:

- the period of flooding in January 2013 was shorter with flows in the Dawson River exceeding 2000 metres cubed per second (m^3/s) for only 2 days, compared to 14 days in December 2010/January 2011
- the peak flow in January 2013 only reached 2400m^3/s, compared to 6000m^3/s in December 2010/January 2011
- as a result of the lower peak flow in January 2013, the peak flood stage was up to 6m lower and had a smaller flood extent than the December 2010/January 2011 flood event
- limited water level response to the January 2013 rainfall event was observed in the alluvium or other monitoring bores in the area.

DNRM did not raise any further issues in this regard and EHP agrees with the proponent's reasoning for not using data from the January 2013 event in the groundwater modelling.

DNRM noted that the hydraulic conductivity used to model the Rewan Formation was lower than in other areas of the Bowen Basin and requested the proponent to provide contoured drawdown outcomes from the sensitivity analysis, particularly in relation to the variation in impacts on the Rewan Formation. DNRM also requested the proponent to provide a more detailed description of impacts of the variations of the parameters in the sensitivity analysis. In response, the proponent clarified that the adopted value of vertical hydraulic conductivity value for the Rewan Formation was determined by automated calibration using parameter estimation software. The proponent also referred to section 2.9.2 of the groundwater assessment in Appendix D of the EIS, which included a comparison of the adopted vertical hydraulic conductivity value for the Rewan Formation with a number of other projects in Queensland. The value chosen for the BNCOP is the third lowest of the seven presented, and is within one order of magnitude of three of the other six reported values. Consequently, the proponent considers that the adopted hydraulic conductivity value for the Rewan Formation for the assessment of the BNCOP is acceptable. The proponent also stated that the drawdown contours for the water table were included because other strata in the vicinity of the BNCOP have very few known users. The Rewan Formation, in particular, is not a commonly used groundwater source and is generally considered an aquitard, rather than an aquifer. Due to the lack of groundwater use (human or natural) in or from the Rewan Formation, the important effect was considered to be how the formation is able to transmit drawdown stress to overlying regolith, including alluvium and colluvium, rather than drawdown itself. Further information about the outcomes of the sensitivity analysis was included in Attachment A of the Supplementary Report. DNRM was satisfied with the proponent's response and did not raise any further issues in this regard.

DNRM requested the proponent to present contoured predicted drawdowns for all layers of the groundwater model. In response, the proponent presented drawdown contours for 9 of the 16 model layers in Attachment A of the Supplementary Report, and noted the following:

- the presented contours are the maximum predicted drawdown from any of the calibration model or sensitivity runs
- the coal seams, and not the interburden, have been presented because they are more permeable, which allows a wider spread of drawdown from the mine
- drawdown spreads down-dip (west) in each of the model layers, due mainly to the absence (erosion) of the coal measures to the east of the mine, and the presence of only the low permeability Gyranda Formation to the east
- the mapped 1m drawdown contour just intersects the western model boundary in Layer 14 (the lowest of the modelled coal seams in the Baralaba Coal Measures), which in reality, is a very unlikely occurrence because the permeability of the coal measures would be reduced due to overburden pressure limiting the development or aperture of secondary porosity
- given that the Rewan Formation has a low permeability and is about 500m thick at the western boundary of the Baralaba North/Wonbindi North Mine, the drawdown occurring in the overlying surficial deposits is much lower than the maximum predicted drawdown in the Rewan Formation.

Although the proponent did not provide drawdown contours for every layer in the groundwater model as requested, DNRM was satisfied with the proponent's response and did not raise any further issues on this subject.

DNRM requested the proponent to consider where drawdown is predicted and to ensure that the groundwater monitoring program be able to monitor the ongoing variation of water levels in these areas, in order to validate model predictions and understand the full impacts of mining on groundwater values. In response, the proponent stated that groundwater monitoring would continue generally in accordance with the existing environmental authority (EA) conditions. Furthermore, a number of additional vibrating wire piezometers and standpipe monitoring bores in areas where drawdown is predicted to occur (i.e. to the north of the BNCOP) have been added to the groundwater monitoring program. The proponent also committed to undertaking investigative drilling in the North-west Soak, and if warranted by the geology, would add additional multi-level piezometers in the North-west Soak to monitor any potential water level changes as a result of mining. EHP has since developed recommended groundwater monitoring conditions for the draft EA that include the requirement for the proponent to detect changes in groundwater levels.

DNRM requested the proponent to include a commitment in the EIS that the primary purpose of the groundwater monitoring program would be to detect changes in water levels caused by mining. In response, the proponent committed to conducting an expanded groundwater monitoring program in accordance with the proposed groundwater monitoring conditions, including changes to groundwater levels, as specified in section 6.2.3 of the EIS. Upon review of the proponent's response, DNRM advised that while the proponent had committed to continue to monitor groundwater associated with the continuation of mining, it had not included a clear commitment that the groundwater monitoring program would be specifically designed to detect changes in water levels in areas of predicted drawdown. EHP has since developed recommended groundwater conditions to be included in the draft EA for the project (see Appendix 1 of this report) that require the proponent to monitor groundwater levels in the vicinity of the project to determine any changes to levels as a result of the mining activities. Consequently, EHP considers that the groundwater monitoring program is adequate for the purposes of determining changes in groundwater levels as a result of mining.

Conclusions and recommendations

The EIS used adequate studies, survey methodology, and survey effort to assess potential impacts on water resources (sections 24D and 24E of the controlling provisions). The mitigation and management measures proposed by the proponent are considered adequate to manage potential impacts during the life of the project. The proponent's commitments in the EIS to undertake ongoing monitoring programs during the life of the BNCOP are reflected in the recommended draft EA conditions included in Appendix 1 of this report.

The state generally agrees that the water resources issues raised by the IESC are relevant, but is of the opinion that the proponent's response to the advice adequately addresses the key issues raised by the IESC. The IESC advised that a geomorphological assessment needs to be undertaken by the proponent to predict the likelihood of river erosion that may result in realignment of the Dawson River through the pit or final void and to understand the risks to long term floodplain stability, water quality and riparian and floodplain ecosystems of the final landform. However, for the reasons given above in relation to IESC's issue 3, a detailed site investigation of the geomorphological conditions of the Dawson River floodplain is deemed unnecessary.

The IESC has advised the proponent to undertake spatially and temporally representative monitoring of annual fluctuations in surface water, groundwater, water chemistry and aquatic ecosystems. The recommended EA conditions in this assessment report will satisfactorily address the need for such monitoring. Consequently, there are no additional recommendations with regard to water resources for the project.

5.10.2 Flora and fauna

Section 3.1 of the EIS described the terrestrial ecology values within the project area and provided an assessment of the potential for these values to be directly or indirectly impacted by the project. Detailed information on the terrestrial ecology assessment was included in Appendix A (Terrestrial ecology assessment) of the EIS, which was peer reviewed by Professor David Goldney. Broad environmental objectives were outlined that would be applied to the terrestrial ecology values in the BNCOP area. The potential impacts on terrestrial ecology values were detailed, including an assessment of the likely cumulative and residual impacts. Mitigation, management and monitoring measures, including the provision of offsets, were proposed to avoid and minimise adverse impacts on particular features, areas of vegetation, fauna habitat and watercourses. A separate report in Appendix Q (EPBC Act controlling provisions assessment) of the EIS provided the assessment of matters of national environmental significance (MNES) and as the Supplementary Report (August 2014) quantified the residual impact to MNES for which offsets would be required and detailed the proponent's commitment to provide an offset delivery plan prior to an application for an EA. On 29 August 2014, the proponent provided further information to EHP about the amount of significant residual impact to matters of state environmental significance (MSES).

5.10.2.1 Assessment methodology

The EIS described the desktop studies of terrestrial flora and fauna that were undertaken prior to field surveys to identify the potential ecological values present within and surrounding the BNCOP area (which is an area surrounding the approved Baralaba North/Wonbindi North Mine). The desktop studies paid particular attention to values that are protected under state and Commonwealth legislation. Flora surveys were conducted to verify desktop results, and included targeted searches for threatened flora species and weed infestations. Surveys also determined the location, extent and condition of native vegetation across the study area relevant to regional ecosystem descriptions and EPBC Act threatened ecological communities criteria. Vertebrate fauna surveys focussed on: the actual or likely presence of threatened and migratory species; the location, extent and condition of fauna habitats, particularly breeding habitats; and the presence of pest species. Flora and fauna surveys were conducted after summer between 12 and 21 April 2013 and after winter between 19 and 29 October 2013. Further information about the nature of the surveys is provided in section 5.10.1.4 of this report.

5.10.2.2 Ecological values

The BNCOP area is located within the north-eastern part of the Brigalow Belt South Bioregion. Bioregional corridors are associated with the Dawson Range located 10km to the west of the project area and the Dawson River located approximately 1km to the east of the project boundary. The BNCOP area and surrounding area has been extensively cleared and is mostly used for agriculture. The remnant vegetation within the BNCOP project area occurs mainly in patches, often associated with watercourses, windbreaks or stock shelters, with 78% of the area predominantly cleared land.

Vegetation communities

The proponent surveyed 16 individual native vegetation communities that were made up of nine regional ecosystems, of which three have 'endangered' biodiversity status, four have 'of concern' biodiversity status, and the remaining two have 'no concern at present' biodiversity status (see Table 5-8).

The surveys identified numerous errors in the published mapping of the extent of remnant vegetation and regional ecosystems within the study area and reported 1,121ha of remnant vegetation in the project area which was a greater extent than indicated by the published mapping. The proponent stated that the discrepancy was due to the broad scale of the published mapping (1:100,000 scale) which had not recorded regional ecosystems in smaller patches.

Table 5-8 Regional ecosystems in the BNCOP area
(Source: Table 5 of Appendix A of the EIS, and data provided by proponent)

Regional ecosystem	Description	Vegetation Management Act class	Biodiversity status	Mapped regional ecosystem area (ha)	Ground-truthed regional ecosystem area (ha)
11.3.1	*Acacia harpophylla* and/or *Casuarina cristata* open forest on alluvial plains	Endangered	Endangered		13.3
11.3.2	*Eucalyptus populnea* woodland on alluvial plains	Of Concern	Of Concern	135.1	67.6
11.3.25	*Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines			0.1	
11.3.27	*Freshwater wetlands*	Endangered	Of Concern		1.5
11.3.3	*Eucalyptus coolabah* woodland on alluvial plains	Endangered	Of Concern		1.5
11.3.4	*Eucalyptus tereticornis* and/or *Eucalyptus spp*. woodland on alluvial plains	Endangered	Of Concern	1.6	2.3
11.4.8	*Eucalyptus cambageana woodland to open forest with Acacia harpophylla or A. argyrodendron on Cainozoic clay plains*	Endangered	Endangered		14.1
11.5.5	*Eucalyptus melanophloia, Callitris glaucophylla* woodland on Cainozoic sand plains/remnant surfaces.	Endangered	No concern at present		2.1
11.5.9	*Eucalyptus crebra* and other *Eucalyptus spp.* and *Corymbia spp.* woodland on Cainozoic sand plains/remnant surfaces	Endangered	No concern at present		178.6

Terrestrial flora species

A total of 109 native flora species and 37 introduced flora species were identified from the surveys in the BNCOP area and surrounds. No flora species listed as threatened under the NC Act (endangered, vulnerable, near threatened) or EPBC Act (endangered, vulnerable) were recorded in the BNCOP area or surrounds.

Terrestrial fauna species

Surveys recorded a total of 201 fauna species within the study area, comprising 15 amphibian species, 27 reptile species, 136 bird species, 23 mammal species and five declared pest animals.

The following species listed as threatened or special least concern under the NC Act were found to occur in the survey areas:

- squatter pigeon(*Geophaps scripta scripta*) – vulnerable
- ornamental snake (*Denisonia maculata*) – vulnerable
- south-eastern long-eared bat[3] (*Nyctophilus corbeni*) – vulnerable
- black-necked stork (*Ephippiorhynchus asiaticus*) – near threatened
- cotton pygmy-goose (*Nettapus coromandelianus*) – near threatened
- little pied bat (*Chalinolobus picatus*) – near threatened
- short-billed echidna (*Tachyglossus aculeatus*) – special least concern.

The EIS also identified the likelihood of threatened species listed under the NC Act to occur within the survey area based on habitat availability and condition:

Species considered likely to occur

- saltwater crocodile (*Crocodylus porosus*) – vulnerable
- brigalow scaly-foot (*Paradelma orientalis*) – vulnerable
- Fitzroy river turtle (*Rheodytes leukops*) – vulnerable
- koala (*Phascolarctos cinereus*) – vulnerable.

Species considered to possibly occur

- red goshawk (*Erythrotriorchis radiatus*) – endangered
- square-tailed kite (*Lophoictinia isura*) – near threatened
- black-chinned honeyeater (*Melithreptus gularis*) – near threatened
- star finch (eastern) (*Neochimia ruficauda ruficauda*) – endangered
- Australian painted snipe (*Rostratula australis*) – vulnerable
- collared delma (*Delma torquata*) – vulnerable
- yakka skink (*Egernia rugosa*) – vulnerable.

Species considered unlikely to occur due to lack of suitable habitat

- black-throated finch (*Poephila cincta cincta*) – vulnerable
- black-breasted button quail (*Turnix melanogaster*) – vulnerable
- large-eared bat (*Chalinolobus dwyeri*) – vulnerable
- northern quoll (*Dasyurus hallucatus*) – least concern.

Aquatic species

The aquatic ecology assessment identified the following values as occurring in the survey area:

- fifty species of aquatic plants
- two declared pest plants – *Hymenanchne amplexicaulis* and *Eichhornia crassipes*
- common and abundant macroinvertebrate taxa included water mites (*Acarina*), freshwater shrimp (*Atyidae*), beetles (*Dytiscidae*, *Hydraenidae* and *Hydrophilidae*), non-biting and biting midges

[3] the record of the south-eastern long-eared bat at the site is speculative as anabat calls are not definitive for the species

(*Ceratopogonidae*; *Chironomiane* and *Tanypodinae*), water boatman (*Corizidae*), mayflies (*Baeitidae* and *Caenidae*) and caddis flies (*Leptoceridae*). *Plecoptera*, *Ephemeroptera*, and *Trichoptera* richness was highest in the Dawson River and lowest in the upper reaches of Saline Creek.

- four species of macrocrustaceans
- twenty-two species of fish of which two were exotic species – mosquitofish (*Gambusia holbrooki*) and goldfish (*Carassius auratus*)
- three species of turtle – Kreffts river turtle (*Emydura macquarii kreftii*), broad-shelled turtle (*Chelodina expansa*) and white-throated snapping turtle (*Elseya albagula*) – (the latter has been recommended for endangered status under NC Act)
- three stygofauna taxa (two in an alluvium aquifer and one in a deeper groundwater aquifer).

5.10.2.3 Impacts and significance of impacts

Land clearing associated with the BNCOP project would result in the loss of remnant regional ecosystems, and the loss and fragmentation of habitats. Furthermore, fauna present within the area would be at risk of injury or fatality during clearing activities. In general, mining activities have the potential to cause various impacts, which the EIS considered, including the following issues:

- changes to surface water quality and quantity could have an indirect impact on ecosystems surrounding the project area
- changes to groundwater quality and quantity could have an indirect impact on ecosystems surrounding the project area, particularly ecosystems that are dependent on groundwater
- soil disturbance, vehicle movements and movement of soil could spread weeds during construction and operation of the project
- noise, dust and artificial lighting associated with the project could degrade vegetation and habitat surrounding the project area
- increased vehicle movement could result in injury or mortality to some fauna species
- altered fire regimes could impact on natural ecosystems.

Vegetation communities

A total of 277ha of remnant vegetation would be cleared over a period of 15 years during construction and operation of the project. In the project area, the vegetation communities that would require clearing include:

- 14ha of brigalow woodland (RE 11.3.1)
- 14.5ha of brigalow palustrine wetland (RE 11.4.8a)
- 5ha of riparian woodland (RE 11.3.4)
- 243.5ha of eucalypt open woodland forest (REs 11.5.5, 11.3.2, 11.5.9 and 11.3.27i).

The EIS considered the potential impacts of the project on threatened ecological communities against the MNES significant impact guidelines and concluded that the potential project impacts on the brigalow (*Acacia harpophylla* dominant and co-dominant threatened ecological community (brigalow TEC) (14ha) were not significant based on the small area of clearing, fragmented occurrence, and poor condition of these communities. Mining would avoid clearing of the coolibah – black box woodlands of the Darling Riverine Plains and Brigalow Belt South Bioregions threatened ecological community (coolibah-black box TEC).

Terrestrial flora and fauna

The Supplementary Report identified the project would result in clearing of the following ecological values that are matters of state environmental significance as defined by the Queensland *Environmental Offset Act 2014*:

- approximately 33.5ha of potential habitat for the ornamental snake
- approximately 277ha of habitat for the squatter pigeon (southern), south-eastern long-eared bat and brigalow scaly-foot; which also has connectivity value as remnant vegetation
- 24.96ha of essential habitat for the squatter pigeon (southern) in addition to the 277ha mentioned above
- 227.5ha of potential habitat for short-beaked echidna
- remnant endangered regional ecosystems—specifically 2.5ha of RE 11.3.1, and 2.5ha of RE 11.4.8a

- remnant of concern regional ecosystems— specifically 5ha of RE 11.3.4, and 63ha of RE 11.3.2
- approximately 1.5km of an ephemeral first order stream (area yet to be determined).

5.10.2.4 Proposed mitigation measures

The EIS proposed several measures to avoid and mitigate potential impacts on vegetation communities, such as:

- refinement of the mine design to avoid land clearance, whereever possible
- vegetation clearance procedures
- management of species with conservation significance
- progressive rehabilitation
- declared animal control strategies
- weed management
- control of cattle grazing
- bushfire prevention and management
- miscellaneous programs including: noise and dust management; artificial lighting; water management; erosion and sediment control; and vehicle speed limits
- education of personnel
- monitoring.

Rehabilitation – Strategies and methods

A final void covering 145ha would remain at the end of mining. It would be reshaped and rehabilitated, to avoid serious environmental harm to land, surface waters or groundwater aquifers. The final void would be bunded to provide flood immunity up to the PMF level (see section 5.10.1.5, IESC issue 3 for details).

Elevated landforms (e.g. spoil dumps) would be designed to be stable and would be revegetated with native species to control erosion. The upper surface of rehabilitated elevated landforms would have a final land capability classification of class 4 – agricultural land suitability (marginal land with severe limitations). The slopes of rehabilitated elevated landforms would have a final land capability classification of class 5 – agricultural land suitability (unsuitable land with extreme limitations). Final land uses would include cattle grazing and areas of nature conservation. The following design parameters would be used to create stable landforms:

- outer slopes of no greater than 14.5% (about 1 in 7 slope)
- maximum effective slope length of 130m
- 10m wide drainage berms installed on side slopes to limit effective slope lengths
- vertical height of final landforms no more than 50m above pre-mining ground level
- gently sloped surfaces on the elevated plateau and shaped to direct water off the spoil dumps
- installation of erosion and drainage structures to direct water down the slopes and around the base of the spoil dumps into sediment dams
- soil placement and ripping on the contour
- application of an appropriate seed mix (such as pasture seed with a selection of native trees and shrubs), with fertiliser, if necessary.

Infrastructure areas, including water storage structures would be removed from the site and revegetated with pasture species that support cattle grazing, similar to the surrounding area. The slopes of infrastructure areas would generally be less than 5% and have a final land capability classification of class 4 – agricultural land suitability (marginal land with severe limitations).

A rehabilitation monitoring program has been developed for the existing operations and would be amended to incorporate rehabilitation of the BNCOP. The program includes key indicators to be monitored in the rehabilitated landscape to evaluate whether the success criteria are being met. Monitoring of rehabilitated landforms would involve an assessment of erosion control success. Any instability caused by erosion, piping failures, or geotechnical failures would be identified during annual assessments and remedial actions implemented. Remedial actions would comprise backfilling, reshaping, redirection of surface water flows that caused the instability, and revegetation works (e.g. seeding). A topsoil management plan would be implemented to ensure that soil resources

are available for rehabilitation.

Rehabilitation success criteria for the BNCOP would be developed having regard to the Leading Practice Sustainable Development Program for the Mining Industry: Mine Closure and Completion (Commonwealth Department of Industry Tourism and Resources, 2006b). The success criteria would be periodically updated to reflect evolving site rehabilitation practices and standards in consultation with relevant stakeholders. EHP noted that additional rehabilitation objectives and indicators and specific rehabilitation goals for each objective would need to be provided in accordance with the requirements of the guideline: Rehabilitation requirements for mining projects (EHP, 2014). The proponent should provide the additional information with the EA amendment application for the BNCOP.

5.10.2.5 Offsets

The proponent has committed to providing an offset delivery plan prior to commencement of construction activities associated with the project and in accordance with the Environmental Offsets Act 2014, Queensland Environmental Offsets Policy, and EPBC Act Environmental Offsets Policy. The proponent committed to providing the following offsets for significant residual impacts on MNES and MSES:

Matters of National Environmental Significance

- 9ha of brigalow TEC
- 33.5ha of ornamental snake potential habitat
- 277ha of habitat for the squatter pigeon (southern) and south-eastern long-eared bat.

Matters of State Environmental Significance

- 5ha of RE 11.3.4
- 63ha of RE 11.3.2
- 1.5km of first order stream
- 227.5ha of short-beaked echidna habitat.

The 277ha offset for MNES matters would also satisfy the MSES offset for habitat of the brigalow scaly-foot and the connectivity values of remnant vegetation.

The proponent has not provided a comprehensive biodiversity offset strategy, but has stated that investigations have commenced to identify suitable offset lands focused on adjacent proponent owned lands, including brigalow woodland with recorded squatter pigeon occurrence to the south-east of the project area and other adjacent land with potential habitat based on ornamental snake records.

5.10.2.6 Major issues raised in submissions

With regard to the ornamental snake, DOTE requested that the proponent:

- clearly identify the area of habitat critical to the survival of the ornamental snake that would be impacted by the action
- provide commitments to avoid and mitigate the impacts
- provide an offset for any a residual significant impact.

DOTE later clarified critical habitat to mean important habitat as defined in the Draft referral guidelines for the nationally listed brigalow belt reptiles, (SEWPaC, 2011).

The proponent advised there was 130ha of potential habitat for the ornamental snake within the action area. However, due to its highly disturbed nature from cattle grazing, previous clearing, limited suitable micro-habitat (e.g. fallen timber) and limited food supply (e.g. frogs), the habitat is highly unlikely to support the ornamental snake. Consequently, the proponent assessed that the potential habitat was not important habitat for the ornamental snake. DOTE accepted the proponent's assessment, and did not raise any further issues in this regard.

DOTE also requested further information about whether the greater brigalow community on-site was representative of the brigalow TEC listed under the EPBC Act. The proponent advised that many of the patches of brigalow were not of sufficient quality to meet the TEC criteria. Consequently, the proponent assessed that only 9ha of the brigalow community would meet the brigalow TEC definition under the EPBC Act. The Department of the Environment accepted the proponent's assessment of the area of brigalow TEC occurring on the project site and did not raise any further issues in this regard.

The Department of the Environment requested detail of the proponent's survey effort for Fitzroy River turtle (Rheodytes leukops) and clarification in relation to potential habitat for this turtle species in the project area. The proponent responded with detail of the survey method used for the EIS, which included the following:

- setting cathedral traps and fyke nets
- day-time searching for nesting sites and suitable nesting areas
- evening spotlighting for a period of one hour from a boat over a distance of 1km.

The proponent also confirmed that no preferable habitat for Fitzroy River turtle was found in the action area. The preferable habitat in the Dawson River and Dawson River anabranch was located outside of the action area and would not be impacted by the project. DOTE accepted the proponent's assessment that no preferable habitat for the Fitzroy River turtle occurs on the project site, and did not raise any further issues in this regard. DOTE asked the proponent to explain why they did not carry out targeted surveys for black-throated finch and large-eared pied bat in the action area. The proponent explained that no potential habitat for either species was identified in the action area and there were no database records of the Large-eared Pied Bat within an 80km radius of the action area. Further, there were only 2 database records of the Black-throated Finch within an 80km radius, the closest of which was some 42km to the north-west in the Dawson Range State Forest. DOTE accepted the proponent's justification for not conducting targeted searches for the black-throated finch and large-eared pied bat and did not raise any further issues in this regard.

DOTE asked the proponent to explain why they did not carry out targeted surveys for black-throated finch and large-eared pied bat in the action area. The proponent explained that no potential habitat for either species was identified in the action area and there were no database records of the large-eared pied bat within an 80km radius of the action area. Furthermore, there were only 2 database records of the black-throated finch within an 80km radius, the closest of which was some 42km to the north-west in the Dawson Range State Forest. DOTE accepted the proponent's justification for not conducting targeted searches for the black-throated finch and large-eared pied bat, and did not raise any further issues in this regard.

DOTE and the Fitzroy Basin Association requested clarification of the project's offset liability for residual significant impacts that cannot be avoided or mitigated. The proponent responded with a commitment to provide offsets for residual impacts to brigalow TEC, and habitat for the ornamental snake, squatter pigeon (southern) and south-eastern long-eared bat in accordance with the EPBC Act Environmental Offsets Policy and the EPBC Act Offsets Assessment Guide. DOTE requires the proponent to prepare a biodiversity offset strategy for the residual impacts of the project on TECs and listed threatened species. Specific requirements of the offset strategy are provide in the recommendations below.

EHP requested the proponent to provide further information about the proposed mechanism and timing of offset delivery in order to meet the requirements of the Environmental Offsets Act 2014. The proponent responded that further information about the proposed offset delivery mechanism would be provided once EHP had imposed a condition on an EA requiring an offset. EHP is satisfied with this approach, and would require the proponent to formalise the details in a biodiversity offset strategy (see section 5.10.2.7 for details).

The Fitzroy Basin Association requested clarification on the impact of the project on GDEs. The proponent stated that the potential impacts of changes to baseflow contributions on downstream features would be limited, and that there was not expected to be any measurable changes in quality of groundwater as a consequence of the proposed project. The Fitzroy Basin Association did not raise any further issues, and EHP is satisfied that the groundwater monitoring and REMP reporting required by the recommended conditions for the draft EA will identify any potential impacts on GDEs.

5.10.2.7 Conclusions and recommendations

The final TOR required the proponent to provide sufficient evidence in the EIS to show that the following performance outcomes that relate to flora and fauna can be achieved:

- areas of high conservation value and special significance likely to be affected by the proposal are identified and evaluated and any adverse effects on the areas are minimised, including any edge effects on the areas
- the activity does not have an adverse effect beyond the site
- activities that disturb flora and fauna will be managed in a way that prevents or minimises adverse effects on the identified environmental values
- there will be no potential or actual adverse effect on wetlands as part of carrying out the activity
- the activity will be managed in a way that prevents or minimises adverse effects on wetlands

- areas disturbed will be rehabilitated or restored to achieve sites that are:
    - safe to humans and wildlife
    - non-polluting
    - stable
    - able to sustain an appropriate land use after rehabilitation or restoration.

In order to meet these outcomes, the proponent has committed to:

- implementing vegetation clearing procedures to prevent any unnecessary clearing
- maintaining a 200m mining exclusion buffer between the project activities and the high ecological significance (HES-N) wetland and the North-west soak wetland on-site, and a 100m buffer between mining activities and the Northern Wetland to the north of ML80201
- not disturbing the Dawson River and Dawson River Anabranch and associated riparian zones
- progressively rehabilitating disturbed areas to a land use similar to pre-mining conditions
- offsetting any unavoidable residual impacts on areas of high conservation value.

After reviewing the assessment of impacts and the proponent's impact mitigating commitments, EHP considered the proponent has provided sufficient evidence in the EIS that the flora and fauna performance outcomes can be achieved for the project, and that the requirements of the final TOR with regard to flora and fauna have been adequately addressed.

Draft EA conditions related to the mitigation, management and monitoring measures for flora and fauna are provided in Appendix 1 of this report.

Following Commonwealth assessment and approval, the proponent would need to provide a detailed offset proposal for significant residual impacts to MNES and MSES under the requirements of the EPBC Act environmental offsets policy and the Queensland *Environmental Offsets Act 2014* and environmental offsets policy.

Recommendations

1. Draft EA conditions should limit adverse impacts on MSES to the maximum impacts stated in the EIS.
2. The proponent should provide a biodiversity offset strategy consistent with the requirements of the Queensland *Environmental Offsets Act 2014* and environmental offsets policy, and any relevant conditions of approval under the EPBC Act.
3. The proponent should liaise with EHP's wildlife management branch to determine whether clearing permits and/or species management plans are required under the NC Act and the Nature Conservation (Wildlife Management) Regulation 2006.
4. Water discharge locations on the Dawson River should avoid core feeding and nesting habitat for the threatened white-throated snapping turtle and Fitzroy River turtle. The proponent should undertake surveys to ensure that these habitat values are not disturbed.

5.10.3 Water quality

Section 3.2 of the EIS provided a description of: existing local and regional water quality, including baseline data and the existing monitoring regime; the potential impacts of the BNCOP on groundwater and surface water quality (including cumulative impacts); and the proposed mitigation measures, management and monitoring.

5.10.3.1 Methodology

Section 3.2 of the EIS draws on the results from the following assessments:

- groundwater modelling and assessment in Appendix D of the EIS
- site water balance and surface water assessment in Appendix C of the EIS
- aquatic ecology assessment in Appendix B of the EIS
- geochemistry assessment in Appendix E of the EIS.

Water quality data from a number of different sources have been analysed in the assessment of the BNCOP, including:

- surface water and groundwater quality data from existing and previous monitoring programs in the Dawson River and Dawson River anabranch associated with the Baralaba Coal mine
- surface water quality data from the monitoring of controlled releases to the Dawson River anabranch in accordance with environmental authority (EA) conditions for the Baralaba Coal Mine
- long-term salinity (as electrical conductivity) data for the Dawson River from the Integrated Quantity Quality Model (IQQM)
- water quality data in the Dawson River, Dawson River anabranch, Saline Creek, North-west Soak and the Northern Wetland
- groundwater quality at existing bores within and adjacent to the action area
- rainfall and evaporation records from the Bureau of Meteorology (BoM) weather stations
- rainfall records from the Baralaba Coal Mine weather station
- DNRM Dawson River flow gauge data.

5.10.3.2 Surface water and groundwater quality

Surface water quality

Water quality of the Dawson River is generally characterised by low levels of electrical conductivity (EC). Local EC levels range from 70µS/cm up to 790µS/cm, with a mean value of 201µS/cm. Local pH levels range from 6.8 to 8.2, with a mean value of 7.54. Total suspended solids (TSS) range from 2 milligrams per litre (mg/L) up to 682mg/L, with a mean value of 108mg/L. Turbidity levels range from 1NTU up to 1120NTU, with a mean value of 196NTU. Refer to section 5.10.1.5 of this report for a comparison of local surface water quality with the guideline WQOs.

With regard to metals and inorganics, mean concentrations of aluminium, copper, zinc and nitrate exceeded the ANZECC (2000) trigger values for 95% species protection in slightly to moderately disturbed ecosystems. The mean concentrations of boron, arsenic, manganese and ammonia were within the ANZECC trigger values for 95% species protection in slightly to moderately disturbed ecosystems.

The mean concentrations of total nitrogen, total phosphorus and chlorophyll-a exceeded the WQOs for the Lower Dawson Main Channel and Northern Upland Tributaries. However, the mean sulfate concentration was within the WQO for the Lower Dawson Main Channel and Northern Upland Tributaries.

Groundwater water quality

The alluvial and Permian groundwater pH values are close to neutral at their median values (6.9 for alluvium and 7.2 for Permian). The median recorded values for salinity in the BNCOP locality are approximately 500mg/L in alluvium, and between 2,000mg/L and 4,000mg/L in the Permian strata, including the coal measures. Groundwater in the vicinity of the Baralaba Coal Mine, Baralaba North/Wonbindi North Mine and the BNCOP is unsuitable for use in agricultural and domestic applications due to high salinity levels.

5.10.3.3 Potential water quality impacts

The proposed water management strategy is based on the separation of water from different sources based on the anticipated water quality, as follows:

- water from undisturbed areas would be diverted around disturbed areas and released from the site
- sediment laden run-off from disturbed areas such as spoil dumps will be captured in sediment dams to improve water quality, prior to dewatering to the mine water dam for use in the mining operation (e.g. CHPP, dust suppression, vehicle washdown etc.), or off-site release
- mine-affected water collected in-pit from groundwater inflow and surface water run-off and run-off from coal stockpiles and the CHPP will be captured and retained in the mine water dam and process water dam for use on-site and/or controlled off-site discharge.

Table 5-9 provides a summary of development activities during the various phases of the BNCOP, and the potential impacts on water resources and proposed mitigation measures.

Table 5-9 Potential water quality impacts associated with the BNCOP (Source: Table 10-2 of the Supplementary Report dated August 2014)

Project development phase	Development activities	Potential impacts	Proposed mitigation measures
Design/exploration	Minor land disturbance	Increase in sediment-laden run-off	Implement erosion and sediment control measures
Construction	Land disturbance associated with cut and fill activities	Increase in sediment-laden run-off	Implement an erosion and sediment control plan
Operation	Land disturbance associated with pit excavation and spoil placement	Increase in sediment-laden run-off	Implement an erosion and sediment control plan
	Collection and storage of disturbed area run-off	Changes in receiving water quality from discharge of excess water	Implement a water management and release system, and monitor changes in receiving water quality
	Use and storage of fuels and hazardous materials	Chemical spills that run-off into the water management system and are discharged to the receiving environment	Implement a water management system to segregate clean and dirty water
			Respond to any hydrocarbon spills in accordance with the emergency response plan
Decommissioning	Design and construction of final landforms	Release of sediment or other contaminants through erosion or failure of the final landform	Implement best practice design and construction of the final landform design in accordance with the closure management plan
			Monitor rehabilitation success and landform stability in accordance with the closure management plan

Potential uncontrolled releases from the site could occur from any one of the ten sediment dams (i.e. sediment dams 1 to 9 and the MIA sediment dam) located around the site, as well as from the raw water dam, process water dam or mine water dam (see Figure 5-8).

Controlled releases of mine affected water would continue from RP1 associated with the existing Baralaba Coal Mine. RP1 is associated with mine dam 1 that would contain contaminated run-off from the Baralaba central pit and would release into the Dawson River Anabranch. Controlled releases of mine affected water from the BNCOP are proposed to occur from a new release point known as RP2 (see Figure 5-9). RP2 is associated with mine dams 4a and 4b that would contain contaminated run-off from disturbed areas associated with the northern continuation of mining of the Baralaba central pit, and would also release into the Dawson River anabranch.

An assessment of the potential impact of controlled releases on downstream water quality in the Dawson River was included in the Supplementary Report (August 2014). The results of the water balance model indicate that there would likely be 150 release days over the 15 year life of the project. No releases (and hence no impact on downstream water quality) would occur 97% of the time during the 15 year life of the project. The proportion of assimilative capacity of the receiving environment used by the discharges during the 150 release days was also assessed. The assimilative capacity was defined as the difference between the upstream Dawson River water quality and the corresponding WQO for each parameter. It was noted in the assessment of assimilative capacity that for some parameters the existing upstream Dawson River concentration already exceeds the WQO. The results were indicative of the worst case impacts based on the minimum dilution ratio for each flow scenario (low, medium and high). The overall results of the water balance model predict a negligible impact on the downstream water quality as a result of controlled releases from the BNCOP. The results are summarised as follows:

- during low, medium and high flow release scenarios, nearly all of the water quality parameters in the Dawson River downstream of the discharge location meet the corresponding WQOs, with site discharges consuming less than 50% of the available assimilative capacity for these parameters in the Dawson River
- during the medium flow release scenario, ammonia, turbidity, suspended solids and EC are predicted to

exceed the corresponding WQOs, because for each of these parameters the WQOs were already exceeded in the Dawson River upstream of the discharge location

- during the high flow release scenario, EC is predicted to take up 65% of the assimilative capacity in the Dawson River downstream of the discharge location, but would not exceed the WQO.

5.10.3.4 Proposed mitigation and management measures

The key mitigation measures for the BNCOP would be applied through implementation of the erosion and sediment control plan and water management plan.

In addition to the general mitigation measures outlined in Table 5-9 in section 5.10.3.3 above, the mine water management system would include a series of 1-in-1000-year AEP flood protection levee banks to prevent run-off from undisturbed areas from entering the open-cut mining area. Controlled releases would meet the mine affected water release and quality criteria, including a maximum release rate for all controlled releases of $0.5m^3/s$ as specified in the recommended conditions of the draft EA for the project.

To minimise contaminated run-off from disturbed mining areas, highly weathered or friable overburden would not be used on the surface of rehabilitated landforms and CHPP rejects would be co-disposed with waste rock in-pit.

Coarse rejects and slimes produced at the CHPP and disposed into the pit would be placed below the expected final landform groundwater level and buried by at least 5m (cover thickness) of benign spoil within one month of placement.

The existing REMP would incorporate the BNCOP to assess the condition of receiving waters against the WQOs and background reference sites, monitor changes in concentrations of metals and metalloids in sediments, and monitor for changes in macroinvertebrates.

Additional groundwater monitoring bores for the BNCOP would be monitored for changes in groundwater quality and compared against the groundwater investigation trigger levels specified in the EA conditions.

A water management plan would be prepared for the BNCOP including:

- a study of the source of contaminants
- a revised water balance model
- a water management system
- measures to manage and prevent saline drainage
- measures to manage and prevent acid rock drainage
- contingency procedures for emergencies
- a program for monitoring and review of the effectiveness of the water management plan.

Figure 5-8 Site water management system and potential uncontrolled release locations (Source: Figure 5-5 of Appendix C of the submitted EIS)

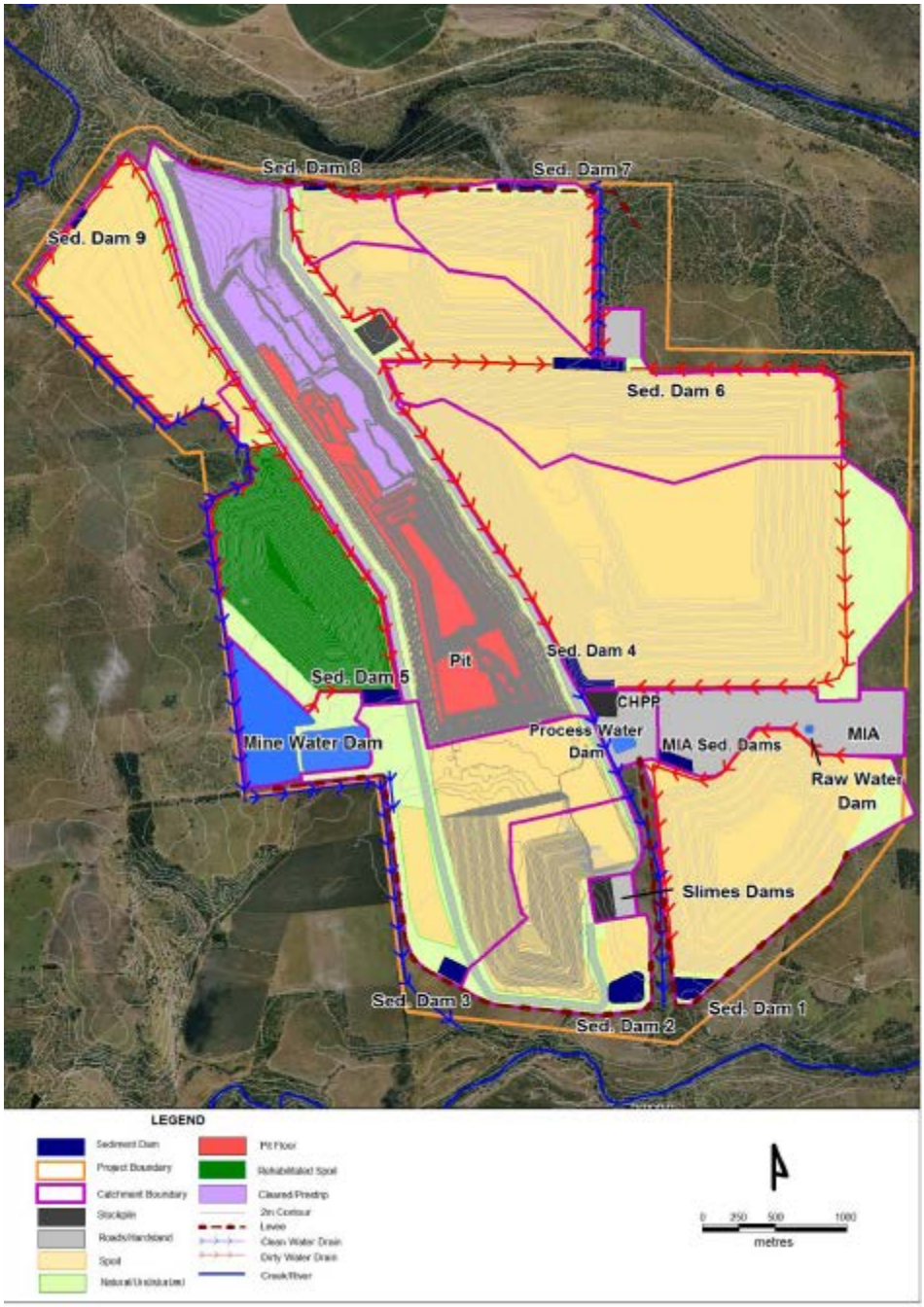
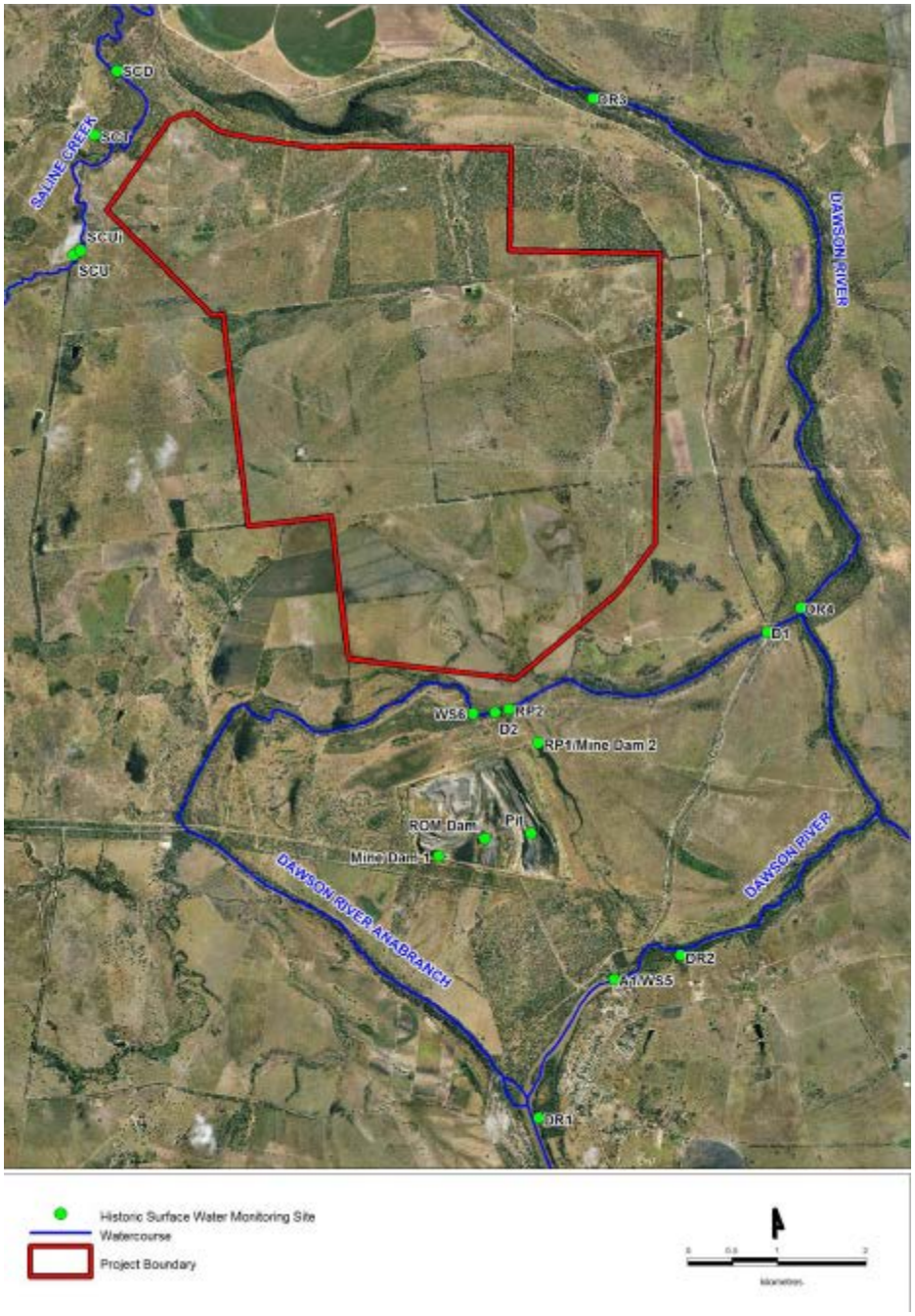


Figure 5-9 Proposed controlled discharge and surface water quality monitoring locations (Source: Figure 4.11 of Appendix C of the submitted EIS)



5.10.3.5 Major issues raised in submissions

The proponent initially used the WQOs for stock watering and irrigation, which they thought were appropriate because they believed there was an absence of guideline WQOs for aquatic ecosystem protection. EHP pointed out that the proponent had overlooked the trigger values specified for slightly to moderately disturbed systems in Table 3.4.1 of the ANZECC and ARMCANZ (2000) guidelines. The proponent currently has insufficient data to derive site-specific WQOs, so EHP requested the proponent to use the metals, metalloids and other toxicants WQOs trigger values for 95% species protection for slightly to moderately disturbed systems specified in the ANCECC and ARMCANZ (2000) guidelines. Those values have been used to develop the contaminant trigger investigation levels in the recommended conditions of the draft EA for the project. When sufficient water quality data has been obtained, the trigger values can be reassessed.

EHP requested the proponent to describe the project activities and the potential impacts of the activities on surface water quality and quantity, as well as proposed management and mitigation measures. In response, the proponent referred to Table 10-2 that was included in the Supplementary Report (August 2014). The new table provided a

summary of development activities during the various phases of the project, as well as the potential impacts on water resources and the proposed mitigation and management measures. The proponent committed to implementing the mitigation and management measures through implementation of an erosion and sediment control plan and water management plan.

EHP requested the proponent to provide information about the predicted water quality of discharges from the project and the potential impacts of any discharges on water quality, including impacts on the assimilative capacity of the receiving environment. In response, the proponent amended section 9 of Appendix C to include the information requested. The key findings are discussed in section 5.10.3.3 of this report.

EHP requested the proponent to relocate the proposed upstream monitoring location on the Dawson River Anabranch further upstream to prevent any mixing with any discharges during low, or no, flow conditions. In response, the proponent provided the coordinates of the revised upstream monitoring location and showed the new location on a suitable map.

EHP requested the proponent to provide information about the flow conditions under which the surface water quality samples were collected to derive locally relevant WQOs. In response, the proponent committed to use the default WQOs, until sufficient background data can be gathered to derive locally relevant WQOs.

The IESC raised a number of issues associated with potential impacts of the project on water quality. The issues and the proponent's response to the issues are discussed in section 5.10.1.5 of this report.

5.10.3.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to the water quality related aspects of the project. Background water quality of the surface and groundwater resources was discussed in the EIS. The proponent concluded that at the time of preparing the EIS there was insufficient local water quality data to derive site-specific WQOs. Consequently, the recommended draft EA conditions include discharge limits based on the default aquatic ecosystem protection guideline WQOs.

The EIS adequately described the potential impacts of site water discharges as a result of the project. Of particular relevance was the conclusion that the existing background water quality appears to exceed the corresponding default WQOs for some parameters. However, these preliminary results would need to be confirmed by a statistically significant dataset based on upstream water quality monitoring, after which, the proponent may apply to amend the default release limits to reflect the site specific background water quality conditions. In the meantime, prior to releases, the concentration of the parameters specified with release limits in the EA would need to be measured and compared with the background water quality and flow rate to ensure that there would not be an increase in the concentrations of these parameters in the receiving waters.

The final TOR requires the proponent to provide sufficient evidence to show that the following performance outcomes that relate to water quality can be achieved:

- there is no controlled discharge to waters of contaminants that may cause an adverse effect on an environmental value from the operation or activity
- contingency measures will prevent or minimise adverse effects on the environment due to unplanned releases or discharges of contaminants to water
- the activity will be managed so that stormwater contaminated by the activity that may cause an adverse effect on an environmental value will not leave the site without prior treatment
- any discharge to water or a watercourse or wetland will be managed so that there will be no adverse effects due to the altering of existing flow regimes for water or a watercourse or wetland.

In order to meet these outcomes, the proponent has committed to:

- include water management measures in the erosion and sediment control plan and site water management plan for the project to ensure that run-off from disturbed areas is prevented from being directly released into the receiving environment
- store water on-site that has been potentially contaminated with salts and other contaminants from the dewatered pit, CHPP and spoil dumps
- monitor the stored water to determine whether it is of a suitable quality, before discharging it to the receiving environment
- only allow controlled discharges when minimum background flow conditions are met, and regulate the flow of the discharge to prevent downstream contaminant loading or alteration of existing flow regimes.

In conclusion, assessment of the potential impacts and the proponent's impact mitigating commitments found the proponent has provided sufficient evidence in the EIS to indicate that the water quality performance outcomes can

be achieved for the project.

Recommended water quality related draft EA conditions are included in Appendix 1 of this report.

There are no water quality specific recommendations.

5.10.4 Water resources

Water resources, including a description of the water resources, potential impacts and proposed mitigation measures are discussed in section 3.3 of the EIS. Further information about site water management is provided in section 2.8 of the EIS. Additional supporting information about changes to hydrology (e.g. changes to flow regimes, recharge rates, aquifer pressure, groundwater table levels, groundwater/surface water interactions, river/floodplain connectivity, inter-aquifer connectivity) is included in Appendix B (Aquatic ecology assessment), Appendix C (Site water balance and surface water assessment) and Appendix D (Groundwater modelling and assessment). Appendix D also included a cumulative groundwater impact assessment of the Baralaba Coal Mine, Baralaba North/Wonbindi North Coal Mine and the BNCOP. A summary of the major issues raised by the IESC and the proponent's response to the issues was included in the Supplementary Report (August 2014) and is discussed in section 5.10.1.5 of this report.

5.10.4.1 Assessment methodology

Section 5.10.1.5 of this report describes in detail the methodology that was used to assess impacts on water resources. In summary, the proponent collected surface water and groundwater quality and quantity data from water quality monitoring programs being undertaken within the local and regional area. A groundwater investigation program was undertaken to define the groundwater resources potentially affected by the project. A site water balance was used to design the site water management system. A geological model was prepared to further define the nature and extent of the groundwater resources and to provide layers for the groundwater model. A groundwater model was prepared to simulate the existing groundwater regime and predict the potential impacts of the BNCOP on the groundwater resources. Also, a geomorphology assessment was undertaken to predict the impacts of the BNCOP on the surrounding alluvium.

5.10.4.2 Existing surface water resources

The BNCOP is located in the lower Dawson River catchment, which has an area of approximately 40,500km2 upstream of the Baralaba township. The Dawson River catchment is part of the Fitzroy Basin, which has a total catchment area of approximately 142,600km2. The Dawson River flows north between the Dawson and Auburn Ranges to meet the Fitzroy River west of Rockhampton. The major drainage features in the vicinity of the BNCOP are the Dawson River and its tributaries, including the Dawson River Anabranch and Saline Creek. The Dawson River Anabranch flows in an easterly direction, immediately to the south of the boundary of the BNCOP. A minor ridgeline runs east-west across the BNCOP area and the northern portion drains to the Northern Wetland and Saline Creek.

The Northern Wetland is a relict drainage line of the Dawson River and lies to the north of the BNCOP boundary. It is mostly perennial, changing in size due to rainfall and flooding from Saline Creek and the Dawson River. The catchment area of the Northern Wetland is approximately 17km2. Saline Creek flows north-east past the north-western boundary of the BNCOP, before joining the Dawson River further downstream. However, it is ephemeral, experiencing some extended periods of no, or negligible, flow during dry weather. The catchment area of Saline Creek is approximately 50km2 to the point of the BNCOP boundary and approximately 292km2 to the junction of the Dawson River. The southern portion of the BNCOP area drains directly into the Dawson River Anabranch and the Dawson River.

The BNCOP is positioned on the floodplain of the Dawson River. The site is within the lower Dawson sub-scheme of the Dawson valley water supply scheme, operated by SunWater. The lower Dawson sub-scheme extends from 24.3km upstream of Neville Hewitt Weir to the downstream limit of Boolburra waterhole and provides water for irrigation, urban town water supplies and water for industry.

The Dawson River is a losing watercourse, particularly at Baralaba, where it is regulated by the Neville Hewitt Weir. The Dawson River has had a median daily flow rate of approximately 14ML since the construction of the Neville Hewitt Weir in 1976. Stream flow in the Dawson River is intermittent, with a flow of less than 0.001m3/s occurring more than 30% of the time.

Water for the project would be supplied from a 500ML water allocation from the Dawson River. The allocation would meet site water demands for the first 5 years of operations and for the majority of the modelled realisations for the remaining years. Additional water supply could be obtained from groundwater inflows into the mining pit, or by purchasing additional Dawson River water allocations.

There would be no diversions of any watercourses defined under the *Water Act 2000*.

Existing groundwater resources

The two main groundwater hydrogeological units and their characteristics within the Baralaba area are the:

- **Quaternary aged shallow alluvial aquifers** associated with modern and relict drainage lines of the Dawson River and its tributaries including Saline Creek and the Dawson River anabranch. These alluvial aquifers are composed of an upper layer of clay and silty clay overlying a basal layer of sand and gravel, ranging in total thickness up to 25m. A perched water table is evident close to surface water sources, above the regional groundwater table.
- **Permian aged Blackwater Group** including all of the coal seams and associated interburden of the Baralaba Coal Measures, comprising groundwater principally associated with the coal seams and in the sandstone/siltstone units of lower permeability.

The typical depth of groundwater in the BNCOP area is generally 10m to 20m below the surface. The area has low recharge rates (generally less than 1% of rainfall) and high evaporation rates. Aquitards of the Rewan Formation and Gyranda Formation lie above and below the Baralaba Coal Measures respectively. The Rewan Formation in particular is thick (up to 500m), and intervenes between the target coal seams for the BNCOP and the Great Artesian Basin (GAB) aquifers. The conceptual groundwater system in the vicinity of the BNCOP is shown in Figure 5-6.

The BNCOP is located outside of any declared groundwater management areas defined in the Fitzroy Basin Water Resource Plan or Great Artesian Basin Strategic Management Plan. Groundwater in the vicinity of the BNCOP is unsuitable for use in agricultural and domestic applications due to high salinity levels.

Wetland resources

Wetland features associated with the BNCOP and surrounding area (Figure 5-7) include:

- Northern Wetland (designated WL2) located adjacent to the boundary of ML80201
- North-west Soak located on the western boundary of ML80201
- two smaller wetland areas: one designated as HES-S that is located adjacent to the eastern boundary of ML80201; and another designated as HES-N that is located just inside the eastern boundary of ML80201. A survey of the HES-S and HES-N wetlands concluded that the actual condition and value of these wetlands do not support the designation of these wetlands as high ecological significance.

The North-west Soak and the Northern Wetland are ephemeral, palustrine wetlands that are unlikely to be dependent on, or connected to, the regional groundwater table. They are considered to exist due to the presence of clays in the shallow subsurface, which allow perched water tables to develop and persist after rain or flood events. There are areas of brigalow (*A. harpophylla*) TEC and coolibah-black box woodland TEC associated with these wetlands, floodplain areas and the Dawson River anabranch.

5.10.4.3 Potential impacts

Surface water flow regimes

The major water storage dams and flood protection levees are shown in Figure 2-1 and Figure 5-11 respectively.

The maximum captured catchment areas during the life of the BNCOP and following completion of mining are provided in Table 5-10.

Table 5-10 Maximum loss of catchment area due to the BNCOP (Source: Table 3-6 of the submitted EIS)

Catchment	Maximum loss of catchment area	
	During mining	After mining
Dawson River (to Beckers stream gauge)	Approximately 0.01%	No measurable change
Saline Creek	<1%	-0.1%
Northern Wetland	52%	23%

Modelling of flood events up to, and including, the 1-in-100-year annual exceedence probability (AEP) shows that the Dawson River overflows the western river bank and directly inundates the Northern Wetland in floods greater than, or equal to, the 1-in-50-year event.

In contrast, water from Saline Creek is likely to overflow into the Northern Wetland during a 1-in-2-year AEP flood event, indicating that there is a better than 50% chance each year that the Northern Wetland will experience flood inflows from Saline Creek. Due to these frequent flood inflows, the impacts on total inflows into the Northern Wetland will be less than might be inferred from its loss of catchment area.

The groundwater modelling and assessment concluded that potential impacts on baseflow contributions to Saline Creek, the Dawson River Anabranch and Northern Wetland would be small, primarily due to the pronounced unsaturated depth. Potential impacts on baseflow to rivers and creeks adjacent to the BNCOP would therefore also be negligible.

No adverse water-related impacts are likely to occur on riparian vegetation and wetlands surrounding the BNCOP including the Dawson River, Dawson River Anabranch or the Northern Wetland to the north of the BNCOP area. This is because no measurable impacts on surface water quantity or quality are likely to occur despite changes in catchment areas and groundwater drawdown.

Site water balance

The results of the site water balance model indicate that there is a low risk of the BNCOP water management system accumulating water over the 15 year mine life, and that the system should recover well after each wet season. The model results show no uncontrolled spills of mine affected water from the mine water dam or process water dam would occur.

Groundwater flow regimes

Permian Aged Blackwater Group

The maximum effect of the BNCOP at or after the end of mining would be a drawdown in the Baralaba Coal Measures of about 10m at the edges of the mining footprint. Notwithstanding this, the numerical modelling conducted for the groundwater assessment in Appendix D of the EIS predicts negligible impact on groundwater levels or groundwater yield for groundwater users with privately owned bores registered on the Queensland groundwater bore database. This is because the closest bore is located 2km to the south, which is right on the edge of the predicted cone of depression. Furthermore, no groundwater bores within the area of predicted drawdown are currently being used, largely due to the high salinity levels.

The average pit inflows over the life of the BNCOP are predicted to be approximately 2.4ML/day (877ML/annum) with a peak rate of approximately 3.5ML/day. However, high evaporation rates would reduce the volume of water that would require active management at the pit floor. The take of groundwater through pit dewatering does not require a licence under the *Water Act 2000* because the project is located in an unincorporated area of the Fitzroy Basin Water Resource Plan.

Quaternary Aged Alluvial Aquifers

Drawdowns are predicted in the regional water table to the north of the BNCOP. The most significant drawdown occurs late in the life of the BNCOP, with maximum drawdowns occurring post mining. Drawdown would occur beneath the perched water tables of the North-west Soak and Northern Wetland. However, the predicted drawdown is not expected to affect the perched water tables, so impact on these two wetlands is expected to be negligible.

No net drawdown in the regional water table is predicted to the east of the BNCOP around the HES-N and HES-S wetlands. These wetlands may also have perched water tables, but if not, any small drawdown impact at these sites would be offset by an increase in recharge and elevated water table conditions in the spoil dumps proposed for the area between the wetlands and final void.

Rewan Formation

The Rewan Formation has relatively low permeability. No wetlands are dependent on groundwater from the Rewan Formation, and it is not exploited as a water resource. Consequently, the issue is not the potential for drawdown within the Rewan Formation, but the potential for the Rewan Formation to transmit drawdown stress to overlying regolith, including alluvium and colluvium. The groundwater modelling and assessment in Appendix D of the EIS indicated the effect would be relatively small, and that 1m drawdown would extend about 2km further north-west along the strike of the coal measures, and between 1km and 1.5km further to the west within the colluvium.

Great Artesian Basin

The Clematis Sandstone is part the Eastern Recharge Zone of the Great Artesian Basin (GAB). The Clematis Sandstone outcrops as the Dawson Range about 10km to the west of the BNCOP. The Dawson Range is a prominent landscape feature of the eastern rim of the Mimosa Syncline, which lies to the west. The Rewan Formation outcrops or subcrops in the Dawson River valley beneath, and to the east of, the Dawson Range, and geologically dips underneath the Clematis Sandstone. The Rewan Formation acts as an aquitard that defines the base of the GAB in this area. The coal seams that are to be mined at the BNCOP subcrop to the east of Rewan

Formation, and dip beneath it. The target coal seams are therefore separated from the GAB by the strata of the Rewan Formation as they dip into the Mimosa Syncline (Figure 5-8).

Because of the geological and hydrological separation of the GAB from the target coal seams, the BNCOP is not predicted to cause a change in flow direction in the hydrogeological units that constitute the GAB, or capture of groundwater from the GAB units. Therefore, the BNCOP would not cause any significant decline in the availability or levels of groundwater in the GAB.

Final void

As part of the site water balance and surface water assessment, Appendix C of the EIS provided a final void water recovery analysis that included groundwater inflows from the groundwater model. The catchment of the final void would be made purposefully small by the placement of waste rock dumps around the void. Inflows of groundwater and rainfall run-off under typical conditions would be significantly less than evaporation, and water recovery analysis concludes that a rainfall event of sufficient magnitude to cause the final void to overflow is very unlikely. Flooding from the Dawson River would not reach the final void up to, and including, the 1-in-1000-year flood event. However, a probable maximum flood in the upstream reach of the Dawson River to the south of the mine would have the potential to flow over a shallow ridge to the south of the final void, and from there run into the pit, possibly causing it to overflow at its northern end back into a lower, downstream reach of the Dawson River. Flushing of the pit in that manner could carry a slug of contaminated water into the river. This situation can be avoided by blocking the flow path into the pit by the strategic placement of waste rock across the ridge to raise it above the level of the probable maximum flood. The level of the probable maximum flood in the lower reaches of the Dawson River would not be high enough to enter the final void at its northern end, so no protection is needed there.

Geomorphology

The risk of geomorphological impacts associated with the BNCOP is considered to be very low. The BNCOP does not interact with the Dawson River main channel flow, and only has a minor interaction with the floodplain or tributary flow for the 1-in-20-year and 1-in-100-year AEP design flood cases. It is expected that this interaction would be less or nil for the smaller, more regular flow events (i.e. 1-in-10-year and less). Furthermore, the locations of the interactions are in areas of low flood velocities in backwater areas of the floodplain. There is also no change in levels and velocities from existing conditions and therefore the potential for floodplain erosion should not change from existing conditions.

5.10.4.4 Proposed mitigation and management measures

Up-Catchment diversions and controlled releases

The existing control practices that prevent run-off water from entering the open-cut mining area, including a series of 1-in-1000-year AEP flood protection levee banks, would be adopted for the BNCOP. Controlled releases would continue to be undertaken in accordance with the mine affected water release and quality criteria, and would include a maximum release rate for all controlled releases of 0.5m^3/s.

Adaptive management

Over the life of the BNCOP, there would be numerous options for adaptive management of the mine water management system to accommodate changing climatic conditions. For example, temporary adjustments to pumping arrangements could be made to accommodate very wet or dry periods. The alternative management approaches that could be used to reduce the risks associated with climatic variability include:

- advanced dewatering within the proposed open cut pit
- use of chemical or other dust suppressants to reduce the amount of water required for dust suppression.

Receiving environment monitoring program

The Baralaba Coal Mine receiving environment monitoring program (REMP) would be reviewed and revised to incorporate the BNCOP and would:

- assess the condition or state of receiving waters, including upstream conditions, spatially within the REMP area, considering background water quality characteristics based on accurate and reliable monitoring data that takes into consideration temporal variation (e.g. seasonality)
- be designed to facilitate assessment against WQOs for the relevant environmental values that need to be protected
- include monitoring from background reference sites (e.g. upstream or background) and downstream sites from the release
- specify the frequency and timing of sampling required in order to reliably assess ambient conditions and to provide sufficient data to derive site specific background reference values in accordance with the

Queensland Water Quality Guidelines

- include monitoring during periods of natural flow irrespective of mine or other discharges
- include monitoring and assessment of dissolved oxygen saturation, temperature and all water quality parameters listed in the controlled release criteria
- include, where appropriate, monitoring of metals and metalloids in sediments in accordance with ANZECC & ARMCANZ (2000) and/or the most recent version of AS5667.1: Guidance on Sampling of Bottom Sediments)
- include, where appropriate, monitoring of macroinvertebrates in accordance with the AusRivas methodology
- apply procedures and guidelines from ANZECC and ARMCANZ (2000) and other relevant guideline documents
- describe sampling and analysis methods and quality assurance and control
- incorporate stream flow and hydrological information in the interpretations of water quality and biological data.

Groundwater monitoring

The existing groundwater monitoring program would be expanded with additional monitoring bores for the BNCOP. In addition to the monitoring sites installed for the groundwater investigation program, the existing groundwater monitoring network would be augmented with investigative drilling in the North-west Soak. If the geology is suitable, multi-level piezometers would be installed to monitor any potential water level changes at the North-west Soak in response to mining.

An investigation would be undertaken in the event that trigger levels described in the EA are exceeded, or groundwater fluctuations are detected in excess of 2m per year beyond predictable seasonal fluctuations.

If a more than negligible impact on water levels in the Northern Wetland was to be identified, potential management measures would include, but not necessarily be limited to:

- interception of direct groundwater inflows from alluvium (or surficial unconsolidated sediments) exposed in the highwall of the open cut prior to it reaching the floor of the open cut and pumping back to the nearest creek/water body (achieved by the installation of sumps and a pump/pipe system on a bench of the open cut)
- sealing the intersected alluvium by selective placement of more weathered material, sourced from pre-stripping operations (e.g. placement and compaction of clay-rich material in thin layers).

Water management plan

The Baralaba Coal Mine water management plan would be reviewed and revised in accordance with the EHP guideline, Preparation of water management plans for mining activities, to incorporate the BNCOP, including:

- a study of the source of contaminants
- a water balance model for the BNCOP
- a water management system for the BNCOP
- measures to manage and prevent saline drainage
- measures to manage and prevent acid rock drainage
- contingency procedures for emergencies
- a program for monitoring and review of the effectiveness of the water management plan.

The water management plan would be reviewed annually by an appropriately qualified person and assessed against the requirements of the EA. A review report would be prepared that includes recommended actions to ensure actual and potential environmental impacts are effectively managed for the coming year and identify any amendments required to the water management plan.

Water management system

The BNCOP water management system would maintain separation between run-off from areas undisturbed by mining and water generated within active mining areas. The water management system would include a combination of permanent structures (e.g. erosion protection levees) that would continue to operate after mining is completed, and temporary structures that would only be required until the completion of the rehabilitation works

(e.g. diversions and sediment dams).

During detailed design of the mining industrial area (MIA) and associated water management system, the proponent has also committed to consider adopting a more stringent sediment dam design criteria and/or altering the operating rules (e.g. pump all collected runoff to the mine water dam) to reduce the risk of potential overflows from sediment dams containing run-off from the MIA.

Groundwater monitoring and management program

The Baralaba Coal Mine groundwater monitoring and management program would be reviewed and revised to incorporate the mining activities associated with the BNCOP, the program would:

- be able to detect a significant change to groundwater quality values due to activities associated with the BNCOP
- include measures to minimise the impact of the BNCOP on groundwater resources
- include contingency procedures for emergencies
- include performance measures for monitoring and review of the effectiveness of the groundwater monitoring and management program.

5.10.4.5 Major issues raised in submissions

The major water resources issues raised in submissions, including issues raised by the IESC and the proponent's response to the issues are outlined in section 5.10.1.5 of this report.

5.10.4.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to the water resources related aspects of the project. The EIS used adequate studies, survey methodology, and survey effort to assess potential impacts on water resources. The mitigation and management measures proposed by the proponent are considered adequate to manage potential impacts during the life of the project. The proponent's commitments in the EIS to undertake ongoing monitoring programs during the life of the BNCOP are reflected in the recommended draft EA conditions outlined in Appendix 1 of this report.

The state generally agrees that the water resources issues raised by the IESC are relevant, but is of the opinion that the proponent's response to the advice adequately addresses the key issues raised by the IESC. Further consideration of the issues raised by the IESC is provided in section 5.10.1.5 of this report.

There are no specific water resources related recommendations.

5.10.5 Flooding and regulated dams

Section 3.4.2 of the EIS provided information about previous flood studies in the area and existing infrastructure in the local area that may influence flooding. Section 3.4.3 and Appendix F of the EIS provided modelling and assessment of potential flooding impacts of the BNCOP. Section 3.4.4 of the EIS outlined the proposed mitigation, management and monitoring measures. Section 3.4.5 of the EIS described regulated dams associated with the project.

5.10.5.1 Flooding and regulated dams methodologies

Flooding

The previous Baralaba North Flood Study (Water Solutions, 2012) was decided to be the most relevant flood study to the BNCOP. The Baralaba North Flood Study investigated the potential flood-related impacts of the now approved Baralaba North/Wonbindi North Mine. The flood model of the Baralaba North Flood Study was reviewed and updated, including a review of stream gauge rating curves, extension and calibration of the hydraulic and hydrology models, and an updated flood frequency analysis. The hydraulic and hydrology models were calibrated and verified against a range of recorded data for the large December 2010 event. The developed hydraulic and hydrology models were used to evaluate potential flooding impacts related to the BNCOP.

Design flood hydrographs for the 1-in-20, 1-in-50, 1-in-100, and 1-in-1000 AEP flood events were developed based on CRC-FORGE design rainfalls and the calibrated hydrology model for the Dawson River and Saline Creek floods. The Bureau of Meteorology's GTSMR method was used to estimate the peak flow for the probable maximum flood in the Dawson River. Three scenarios were modelled:

- the existing/approved operation
- the BNCOP operational mine

- the BNCOP final landform.

The impact of the BNCOP on flood levels, flow velocity and stream morphology was evaluated for each scenario.

Regulated dams

A preliminary assessment of the consequence category of the proposed dams for the BNCOP was undertaken in accordance with the failure to contain criteria in the Manual for assessing consequence categories and hydraulic performance of structures (EHP, 2013).

The mandatory reporting level (MRL) for the BNCOP regulated dams was calculated using a 1-in10-year AEP, 72 hour design rainfall intensity. The design storage allowance (DSA) for the integrated water management system was estimated using the method of operational simulation for performance based containment.

5.10.5.2 Existing environmental values

The BNCOP is located on the floodplain of the lower Dawson River catchment in the Fitzroy Basin. The major drainage features in the vicinity of the BNCOP include the Dawson River and its tributaries, including the Dawson River Anabranch and Saline Creek. The Dawson River is regulated by the Neville Hewitt Weir. Since the construction of the Neville Hewitt Weir in 1976, the Dawson River has a median daily flow of approximately 14 ML. Stream flow in the Dawson River is intermittent with a flow of less than 0.001m^3/s occurring more than 30% of the time. A minor ridgeline runs east-west across the BNCOP area and the northern portion drains to the Northern Wetland and Saline Creek. The southern portion of the BNCOP area drains directly into the Dawson River Anabranch and the Dawson River. Further information about the local catchment condition is provided in section 5.10.4 of this report.

The following existing or approved structures were included in the flood modelling assessment:

- the existing bridge downstream of Neville Hewitt Weir
- the existing Baralaba Central flood protection levee bank
- the approved Northern flood protection levee bank
- the approved Dawson River Anabranch crossing.

5.10.5.3 Potential flooding impacts

The BNCOP would involve the construction of flood protection levee banks and sufficiently engineered spoil dumps to provide flood immunity during mining up to, and including, the 1-in-1000-year AEP event. Furthermore, the final landform design would include spoil dumps above natural ground level on the floodplain of the Dawson River. Consequently, both the mining operation and final landform design would excise part of the Dawson River floodplain, which has the potential to result in flood afflux and increased flood levels in areas of the floodplain upstream and downstream of the project. The potential flood afflux and flow velocity impacts of this flood protection infrastructure, as well as the potential impacts of rehabilitated spoil dumps in the final landform design are discussed below.

Flood afflux levels

For both the mining case and final landform case, the flood modelling for the 1-in-20-year, 1-in-50-year and 1-in-100-year AEP events shows that the maximum afflux in the Baralaba township or at nearby homesteads is less than 0.1m, which is the limit of reporting of the model. Consequently, the likely impact at these locations is expected to be negligible. The flood modelling of the final landform case also indicated that the water level during the 1-in-1000-year AEP event is more than 1m below the lowest edge of the final void.

Changes in velocity

For both the mining case and final landform case, the flood modelling for the 1-in-20-year, 1-in-50-year and 1-in-100-year AEP events shows that there would be some small areas of increased flow velocity to the east of the Baralaba North/Wonbindi North flood protection levee. Modelling of the 1-in-100-year AEP event shows that for the mining case and the final landform case, the maximum predicted increases in flow velocity east of the levee would be 1m/s, and 1.3m/s respectively. However, there are no houses or other built infrastructure in those areas, and the increases in velocity are not expected to cause any significant erosion impacts.

For the 1-in-1000-year AEP event, changes in flood velocities would be generally very low for both the mining case and final landform case. Flood velocities along most of the river channel and floodplain would change by less than 0.1m/s. Adjacent to the Baralaba Central Mine, flow velocities would be reduced. The only locations showing any measurable increase in flood velocity are small isolated areas along the floodplain fringe adjacent to the final spoil dumps. These increases are likely due to modified local flow patterns caused by the new landform features. However, the predicted increases are small, and do not indicate the potential for significant changes in flood

behaviour that would lead to increased risks of erosion.

Stream morphology changes

The BNCOP mining case for the 1-in-50-year AEP event was found to have minimal impact on velocities, bed shear stress and stream power, which are the key indicators of erosion and geomorphological change. The predicted levels are well below the maximum allowable limits for a 1-in-50-year AEP event specified in ACARP (July 2002). The BNCOP final landform case for a 1-in-50-year AEP event showed a reduction in velocities, bed shear stress and stream power in the section between the two levee banks near the Baralaba central pit, which is likely caused by the widening of the anabranch corridor. The predicted levels are also well below the maximum allowable ACARP limits for a 1-in-50-year AEP event. Consequently, it is considered unlikely that the operating mine or final landform design would cause significant impact on the geomorphological stability of the Dawson River and anabranch.

Cumulative impacts

The flood modelling also took into account the potential cumulative impacts of the BNCOP in conjunction with Cockatoo Coal's proposed BSCP, located some 10km upstream of the BNCOP on the Dawson River floodplain. The results for the mining case of the BSCP compared with both the mining case and the final landform design case of the BNCOP, including for the 1-in-1000-year AEP event, shows that the changes in afflux and velocity as a result of the BSCP dissipates well upstream of the BNCOP. Consequently, the cumulative impact was deemed to be negligible.

5.10.5.4 Regulated dams

All dams and levee banks associated with the BNCOP are shown in Figure 5-11 and Figure 2-1 respectively. The dams include a series of ten sediment dams (i.e. sediment dams 1 to 9 and the MIA sediment dam) located around the site that would be designed to temporarily capture run-off from disturbed areas to remove sediment, prior to off-site discharge. Other more substantial dams include the raw water dam, process water dam and mine water dam. A series of flood protection levees, designed to the level of the 1-in-1000-year AEP event plus 0.5m freeboard, would be located to the north of the explosives storage along the northern boundary of ML80201, and to the south-east of the CHPP and eastern spoil dump along the eastern boundary of ML80200 and south-eastern boundary of ML80201.

The mine water dam and process water dam would be regulated storages due to having a significant consequence category according to the Manual for assessing consequence categories and hydraulic performance of structures. The mandatory reporting level (MRL) and design storage allowance (DSA) for the mine water dam and process water dam have been calculated and would be implemented to manage the risk of uncontrolled discharge of mine affected water. Water levels in the mine water dam and process water dam will be reduced to below the DSA by 1 November (i.e. the beginning of the wet season) each year.

5.10.5.5 Proposed mitigation and management measures

Flooding

During the mining operation flood protection levees and engineered spoil dumps acting as levees would be inspected annually, and after major flood events, by a suitably qualified person to identify and rectify any erosion, settlement or slumping. The flood protection levee banks and elevated spoil dumps would be revegetated as soon as practicable to minimise slope face erosion.

While the flood modelling indicated that water would not enter the final void during flood events up to the 1-in-1000-year flood level, the proponent has subsequently committed to bunding the final void to a level above the probable maximum flood level. Refer to section 5.10.1.5 of this report for details of the proposed bunding of the final void.

Regulated dams

A register of regulated dams for the BNCOP would be maintained and supplied annually to the administering authority. The regulated dams would be operated as part of an integrated water management system for the entire site. The integrated water management system would be designed and operated having considered the following:

- the practical limitations of operating pumps and pipelines to redistribute stored water to other parts of the containment system during extreme weather conditions
- physical markers being clearly visible in the regulated dams to identify the DSA and MRL
- the capacity of the water transfer system required to transfer large volumes of water within short timeframes.

A system design plan documenting the design and operating rules of the integrated water management system (including the mine water dam and process water dam) would be prepared and implemented during the life of the BNCOP. The plan would be certified by a suitably qualified person and would include:

- the final construction design plans and operating rules for each regulated dam
- the standards of serviceability and accessibility of water transfer equipment or structures and the operating rules of the water management system as a whole
- the DSA and MRL volumes of each regulated dam to be achieved on 1 November each year
- the design and operational measures to address the practical limitations of operating pumps and pipelines to redistribute water around the water management system during extreme weather conditions.

Each regulated dam would be inspected each year by a suitably qualified person. The inspection would include:

- an assessment of the condition and adequacy of all components of the regulated dams
- preparation of an inspection report about the findings of the assessment and any recommended remedial actions.

5.10.5.6 Major issue raised in submissions

The IESC was concerned that due to the location of the BNCOP on the Dawson River floodplain, key surface water risks would include pit inundation during extreme flood events, potential loss of levees and pit wall failure. In response, the proponent referred to Section 3.4 and Appendix F of the EIS, which outlines the potential risk of flood events associated with the BNCOP, and Section 2.4 of the EIS, which discusses the construction of levees and spoil dumps to provide adequate flood immunity from flood events. The proponent also referred to section 3.4.3 of the EIS which identified that the BNCOP would excise part of the Dawson River floodplain and acknowledged that this has the potential to increase flood levels in the vicinity of the project. However, the proponent referred to the flood assessment in Appendix F, which considered the risk of changes in flood levels and velocities on the project and concluded that water would not enter the final void during flood events up to the 1-in-1000-year AEP event.

Furthermore, since responding to the IESC advice, the proponent has reviewed the mine plan and committed to protecting the final void from filling and flushing during flooding up to, and including, the probable maximum flood event. Refer to IESC issue 3 and Figure 5-10 in section 5.10.1.5 above for further details about flood protection of the final void.

5.10.5.7 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to the flooding and regulated dam aspects of the project. The flood modelling showed that the expected changes in off-site flood levels and velocities would be relatively minor and would not result in impacts to infrastructure or property of sufficient magnitude to warrant any specific off-site mitigation or management measures. The EIS also included an assessment of the hazard category of all dams on-site in accordance with the recommended guideline and identified the regulated dams that require specific conditioning in the project EA. The conditions would cover the design, construction, operation and inspection requirements for regulated structures on the project site. The recommended regulated dams conditions for the project EA are included in Appendix 1 of this report.

With regard to the final landform design and preventing flood waters from entering the final void, it is recommended that the proponent submit a design plan showing the proposed design of the bunding above the probable maximum flood level based on the Figure 5-10 of this report. The design plan should be submitted with the EA amendment application for the BNCOP.

5.10.6 Air

Section 3.5.2 of the EIS described the air quality objectives to be achieved for the project, while section 3.5.3 of the EIS described the potential air quality impacts of the BNCOP and the proposed mitigation and management measures. Section 3.5.4 of the EIS provided the air quality monitoring program. Appendix G of the EIS provided the detailed air quality assessment and technical data.

5.10.6.1 Air quality methodology

The existing meteorological and air quality in the area was reviewed to characterise the existing airshed environment surrounding the project. Available ambient dust deposition data from monitoring conducted in the area was determined unsuitable to quantify the existing background levels due to contamination by insects and plant matter. In the absence of site specific air quality data a desktop review of the NEPM air quality monitoring data for all sites in Queensland was undertaken and data from inland locations similar to the project site were used to provide a conservative estimate of background air quality in the project area. In the absence of comparable NEPM

ambient air quality monitoring data, conservative assumptions were used to estimate the background levels.

Table 5-11 outlines the air quality objectives for the protection of human health and wellbeing that are relevant to the BNCOP. Those objectives were used for comparison with the air quality modelling results. Fine particles (e.g. PM_{10}) and very fine particles (e.g. $PM_{2.5}$) are recognised as potentially harmful to human health.

Table 5-11 Air quality objectives for the BNCOP
(Source: Table 3-8 of section 3.5.2 of the submitted EIS)

Pollutant	Averaging period	Objective	Source
PM_{10}	24-hours	50µg/m^3 (To protect human health)	EPP (Air)[1]
$PM_{2.5}$	24-hours	25µg/m^3 (To protect human health)	EPP (Air)
	Annual	8µg/m^3 (To protect human health)	EPP (Air)
TSP	Annual	90µg/m^3	EPP (Air)
Dust	Annual (Total)	4g/m^2/month	NSW EPA

Table notes: 1. Environmental Protection (Air) Policy 2008
2. NSW Environment Protection Authority, Approved methods for the modelling and assessment of air pollutants in NSW

Suitable emission factors from US EPA studies and Australian studies, where they were available, were used to calculate the likely dust generation rates expected from different project activities, including haul trucks. The dispersion model used those dust generation rates for each project activity.

A combination of the CALPUFF modelling system and TAPM was used to model air quality for three scenarios, specifically three indicative mine plan years 3, 7 and 11. The three modelling scenarios represent the general progression of the mine in a north-westerly direction and capture the progressive development of a number of out-of-pit spoil dumps that would be constructed to the west and east of the active mining areas. The modelling did not take into account any mitigation measures that could be applied to reduce the potential air quality impacts of the project, so the results represent worst case scenarios.

The modelling results were used to predict the potential air quality impacts over the life of the project and determine whether the air quality objectives would be achieved. Mitigation, management and monitoring measures were developed to reduce the potential dust emissions during project operation and achieve compliance with any predicted exceedences of the air quality objectives.

5.10.6.2 Existing airshed environment

Along with agricultural activities and other anthropogenic activities (e.g. vehicle use of unsealed roads), the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine contribute to existing particulate levels and dust deposition in the vicinity of the BNCOP.

A total of twelve sensitive receptors have been identified within the vicinity of the BNCOP. However, two of the twelve properties are owned by Cockatoo Coal and would be managed to prevent occupation during peak project operations. Consequently, these properties have not been considered further in air quality assessment.

PM_{10} monitoring in the vicinity of the project has been conducted using three DustTrak monitoring units since September 2013. The highest 24-hour average PM_{10} concentrations measured at sensitive receptors have been below 50 micrograms per cubic metre (µg/m³), with the exception of two separate occasions that were associated with regional bushfire events. The next highest 24-hour average PM_{10} concentration was 46µg/m³ in January 2014.

Annual average dust deposition monitoring has been undertaken since 2010. The dust monitoring results indicate that annual average deposition levels were generally below 4g/m²/month at most sensitive receptor locations, with isolated elevated levels recorded in 2011, 2012 and 2013 along the mining boundary to the Baralaba Coal Mine and further south towards the Baralaba township in 2013. However, many of the samples were found to be contaminated by insects and plant matter. Consequently, these results were determined to be unsuitable to use for dust modelling purposes.

In the absence of suitable background monitoring data for the BNCOP area, the National Environment Protection Measure (NEPM) air quality monitoring sites were reviewed and available data for PM_{10} was used to estimate typical background levels. For $PM_{2.5}$, total suspended particulates (TSP) and dust deposition estimates were made based on conservative assumptions. Estimated background air quality levels are shown in Table 5-12.

Table 5-12 Estimated background air quality compared to air quality objectives for the BNCOP

Air pollutant	Estimated background level	Air quality objectives
$PM_{2.5}$ (24-hour)	9.7µg/m^3	25µg/m^3
$PM_{2.5}$ (Annual)	3.6µg/m^3	8µg/m^3
PM_{10} (24-hour)	19.4µg/m^3	50µg/m^3
TSP (Annual)	34.1µg/m^3	90µg/m^3
Dust deposition (Annual)	1.8g/m^2/month	4g/m^2/month

5.10.6.3 Potential air impacts

Table 5-13 presents the model predictions, including the cumulative impacts of the project and a comparison with the air quality objectives at each sensitive receptor for year 7 of project operations. Year 7 of project operations represents the worst case modelled scenario where dust generating project activities would be at their highest due to the largest amount of exposed spoil and haul trucks working at the surface of the progressive pit. Furthermore, the model predictions have been calculated without dust mitigation measures.

Table 5-13 Predicted BNCOP and cumulative air quality impacts at each sensitive receptor for modelled scenario (year 7), without dust mitigation measures (Source: Adapted from Appendix G of the submitted EIS)

Receptor ID[1]	Annual average						24-hour			
	TSP (µg/m^3)		Dust (g/m²/month) Total		$PM_{2.5}$ (µg/m^3)		PM_{10} (µg/m^3)		$PM_{2.5}$ (µg/m^3)	
	BNCOP[2]	Cumulative[3]	BNCOP[2]	Cumulative[3]	BNCOP[2]	Cumulative[3]	BNCOP[2]	Cumulative[3]	BNCOP[2]	Cumulative[3]
R3	20	54.1	2.12	3.92	2	5.6	62	81.4	15	24.7
R4	11	45.1	1.97	3.77	1	4.6	44	63.4	8	17.7
R5	6	40.1	1.88	3.68	0	3.6	22	41.4	4	13.7
R6	5	39.1	1.88	3.68	0	3.6	28	47.4	7	16.7
R7	5	39.1	1.86	3.66	0	3.6	32	51.4	7	16.7
R8	2	36.1	1.84	3.64	0	3.6	11	30.4	2	11.7
R9	1	35.1	1.81	3.63	0	3.6	7	26.4	2	11.7
R10	9	43.1	1.92	3.72	1	4.6	29	48.4	6	15.7
R11	4	38.1	1.85	3.65	0	3.6	20	39.4	4	13.7
R12	2	36.1	1.83	3.63	0	3.6	12	31.4	2	11.7
Objective[4]	**90**		**4**		**8**		**50**		**25**	

Table notes:
1. Receptor IDs R1 and R2 are owned by Cockatoo Coal and have not been included in the air quality assessment
2. Modelled contribution of the project at each sensitive receptor
3. Modelled contribution of the project plus estimated background concentrations at each sensitive receptor
4. Air quality objective

The maximum 24-hour average and annual average $PM_{2.5}$ concentrations for all three modelled scenarios at all ten sensitive receptors are predicted to be below the air quality objective of 25µg/m³ and 8µg/m³ respectively.

The 24-hour average PM_{10} concentrations during years 3 and 7 of project operations are predicted to exceed the air quality objective of 50µg/m^3 at three of the ten sensitive receptors, without the implementation of dust mitigation measures. The 24-hour average PM_{10} concentration is also predicted to exceed the 24-hour PM_{10} air quality objective at one of the ten sensitive receptors in year 11 of operations, without dust mitigation. The 24-hour average PM_{10} concentrations for all other sensitive receptors (including the Baralaba township) during all three modelled scenarios are predicted to be below the air quality objective of 50µg/m³.

The annual average TSP concentrations at all sensitive receptors for all three modelled scenarios are predicted to be below the air quality objective of 90µg/m³.

The annual average dust deposition levels at all sensitive receptors for all three modelled scenarios are predicted to be below the adopted air quality objective of 4g/m²/month.

Fugitive emissions from the project would be generated as a result from the following activities:

- combustion of diesel fuel (Scope 1 emissions)
- methane released from exposed coal seams (Scope 1 emissions)
- use of explosives (Scope 1 emissions)
- electricity consumption by the proponent (Scope 1 emissions)
- electricity consumption by other organisations as a result of the BNCOP (Scope 2 emissions)
- transport of coal product to its final destination by rail and ship (Scope 3 emissions)
- end-use of the PCI coal product (Scope 3 emissions).

The estimated annual fugitive emissions during the 15-year life of the BNCOP are predicted to vary from year to year depending on the activities to be undertaken during the various construction, commissioning and progressive ramp-up of operations. However, the estimated average annual scope 1, 2 and 3 and combined carbon dioxide equivalent (CO_{2-e}) emissions as a result of the project are as follows:

- 237,995 CO_{2-e} (Scope 1)
- 91,228 CO_{2-e} (Scope 2)
- 8,838,423 CO_{2-e} (Scope 3)
- 9,167,646 (combined).

The estimated annual average contribution of greenhouse gas emissions from the project (Scopes 1 and 2) represents approximately 0.06% of the annual Australian greenhouse gas emissions during the 2012-13 period, and approximately 0.21% of the annual Queensland greenhouse gas emissions during the 2010-11 period.

5.10.6.4 Proposed mitigation measures

The EIS proposed the following key dust impact mitigation measures to control and manage dust emissions, and minimise the potential air quality impacts:

- dust collection systems while drilling
- blasting stem and charge standards
- watering, chemical treatment, placement of rock sheet and enforcing speed limits on unsealed haul road surfaces
- widen and/or seal the unsealed sections of the coal product road transport route (see section 5.10.8.1 of this report for further details)
- spoil placement at the top of the spoil dump according to weather conditions
- water sprays on stockpiles
- enclosed ROM coal hopper and application of water sprays
- application of water sprays at ROM coal screening facility
- watering exposed surfaces to reduce wind erosion
- progressive rehabilitation
- prohibit off-road vehicular traffic.

The proponent has also proposed proactive and reactive dust control measures, including wind speed alarms, weather forecasting and real-time monitoring of dust levels using DustTrak PM10 monitoring units. The monitoring units would be placed between the BNCOP and the nearest sensitive receptors to identify changing dust conditions and facilitate the adjustment of mining operations and watering controls to further minimise dust emissions at the nearest sensitive receptors.

The existing dust monitoring network at the Baralaba Coal Mine and Baralaba North/Wonbindi North Mine would also be updated to incorporate monitoring locations associated with the operation of the BNCOP. In particular, a dust sampler would be set up to monitor 24-hour average PM_{10} levels in the Baralaba township.

With the proposed dust management measures and proactive and reactive dust control measures in place, the proponent anticipates that the air quality objectives would be met during the operation of the BNCOP.

With regard to fugitive emissions generated as a result of the project, the proponent proposes the following mitigation measures:

- monitoring the fuel efficiency of mobile equipment
- minimising double-handling of materials
- considering the use of alternative renewable energy sources.

5.10.6.5 Major issues raised in submissions

Queensland Health requested the proponent to adequately assess predicted air quality during the construction and operational phases of the project against the health based air quality objectives. In response, the proponent referred (amongst other things) to the findings of the air quality model, which predicted that the project would meet the annual average PM_{10} air quality objective for protecting human health. The proponent also referred to their commitments to cover coal haulage vehicle loads and seal the unsealed sections of the coal product haul road to mitigate off-site dust emissions. In considering the adequacy of the proponent's response to this issue, EHP notes that the predicted exceedences of the 24-hour average PM_{10} air quality objective (designed to protect human health) at some sensitive receptors were based on conservative estimates, without considering the potential reductions that could be achieved by the implementation of dust mitigation measures. Furthermore, the air quality modelling predicts that the project would comply with the $PM_{2.5}$ health based air quality objectives for all modelled cases during the life of the BNCOP. Based on this information and the recommended draft EA conditions in Appendix 1 of this report that require the proponent to comply with the health based air quality objectives for PM_{10} and $PM_{2.5}$ at sensitive receptors, EHP considers that this issue has been adequately addressed.

DAFF requested the proponent to explain the dust modelling results and provide details about dust mitigation measures with regard to project related dust impacts on local cropping and grazing activities. In response, the proponent referred, amongst other things, to section 3.5.3 of the EIS which states that dust deposition levels at sensitive receptors are predicted to be below the air quality objective of $4g/m^2$/month. The proponent also referred to the dust mitigation measures to be implemented as part of the coal product haul road transport route approval and the dust management plans to be implemented for the TLO facility approval. Based on a comparison of the predicted air quality impacts of the project with available information on threshold levels of dust impacting on cropping and grazing activities, EHP considers that the project is likely to result in a negligible impact.

Similarly, a number of local landholders raised concerns about disturbance to cattle productivity and livestock and pasture contamination caused by coal haulage along the transport route. In response, the proponent referred to their commitments to seal the unsealed sections of the coal product transport route to mitigate off-site dust emissions and to cover loads to minimise dust emissions.

A number of local landholders raised concerns about the potential air quality impacts at the approved TLO facility. In response, the proponent referred to the separate assessment and approval process being undertaken for the TLO and the anticipated conditions that would likely include requirements to prepare management plans to manage the potential impacts during the construction and operation of the TLO facility. EHP notes that since the proponent responded to this issue, the TLO facility has been approved subject to conditions, which included the management of air emissions during construction and operation activities. EHP also notes that DTMR has requested the proponent to prepare a coal dust management plan to mitigate coal dust emissions during coal haulage activities (Refer to section 5.10.8.9 for further information). Consequently, EHP considers that this issue has been adequately addressed.

5.10.6.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to air quality related aspects of the project. The EIS adequately described the existing airshed environment that may be affected by the project and adequately described the potential impacts of the project on the receiving environment.

The final TOR requires the proponent to provide sufficient evidence to show that the following performance

outcomes that relate to air quality can be achieved:

- there is no discharge to the air of contaminants that may cause an adverse effect on the environment from the operation of the activity
- fugitive emissions of contaminants from storage, handling and processing of materials and transporting materials within the site are prevented and minimised
- contingency measures will prevent or minimise adverse effects on the environment from unplanned emissions and shutdown and start up emissions of contaminants to air
- releases of contaminants to the atmosphere for dispersion will be managed to prevent or minimise adverse effects on environmental values.

In order to meet these outcomes, the proponent has committed to:

- implement management measures to reduce fugitive emissions
- implement on-site dust mitigation measures during general project operations
- use wind speed alarms, weather forecasting and real-time monitoring of dust levels leaving the site to adjust mining operations and implement dust mitigation to reduce dust levels at sensitive receptors.

While the air quality modelling predicts some exceedences of the health based 24-hour average PM_{10} air quality objective of 50µg/m³ at some sensitive receptors without mitigation measures, the EIS says that the emissions estimates are conservative and are likely to overestimate total dust levels. Furthermore, the implementation of the proposed proactive and reactive dust mitigation, management and monitoring measures proposed in the EIS are expected to sufficiently reduce dust levels to achieve compliance with the health-based 24-hour average PM_{10} air quality objective. Further, the modelling predicts compliance with all other air quality objectives relevant to the project at all sensitive receptors for all three modelled scenarios.

In conclusion, upon review of the assessment of impacts and the proponent's impact mitigating commitments, it is considered the proponent has provided sufficient evidence in the EIS that the air quality performance outcomes can be achieved.

Potential air quality impacts associated with off-site coal product haulage and the construction and operation of the TLO facility have been assessed and approved under separate processes. These activities will be managed according to the air quality conditions specified in the relevant approvals. Consequently, recommended conditions for these off-site activities have not been included in this assessment report.

Based on the proposed mitigation, management and monitoring measures in the EIS, the recommended air quality conditions for the project EA are included in Appendix 1 of this report.

Recommendation

1. In relation to road transport of coal on-site the proponent should liaise with DTMR regarding measures to effectively manage coal dust emissions while loading and hauling coal by road.

5.10.7 Noise and vibration

Section 3.6.2 of the EIS described the environmental values and existing noise levels in the vicinity of the project. Section 3.6.3 of the EIS outlined the potential impacts of the project based on the noise modelling results. Section 3.6.4 of the EIS included the proposed mitigation measures, management and monitoring to minimise the potential impacts of the project. Appendix H of the EIS provided a detailed noise and vibration assessment for the BNCOP with technical data.

5.10.7.1 Assessment methodology

The EP Act and Environmental Protection (Noise) Policy 2008 establish noise level goals for maintaining human health and wellbeing and controlling background creep (i.e. to prevent the cumulative deterioration of the acoustic environment). The proponent has undertaken background monitoring and predictive noise modelling to establish project specific noise quality objectives, with the aim of meeting the noise goals. For the background creep component, background noise monitoring was undertaken and compared with the noise predictions for the project from an acoustic model.

Measured or predicted noise levels are expressed as statistical noise exceedence levels (LAN) which are the levels exceeded for a specified percentage of the interval period. For example, L_{A10} is the noise level that is exceeded for 10% of the sampling period and is considered to be the average maximum noise level.

The equivalent continuous noise level (L_{Aeq}) refers to the steady sound level, which is equal in energy to the fluctuating levels recorded over the sampling period.

The noise quality objectives for the BNCOP are expressed as outdoor noise levels, at 4m from residences, with windows open.

Table 5-14 outlines the noise quality objectives at sensitive receptors relevant to the BNCOP.

Table 5-14 Noise quality objectives for the BNCOP (Source: Table 3-12 of section 3.6.2 of the submitted EIS)

Location	Time period	Human health and wellbeing [dB(A)]			Low frequency[1] dB(L)	Sleep dB(A) L_{Amax}	Blasting	
		$L_{Aeq, adj, (1 hr)}$	$L_{A10, adj, (1 hr)}$	$L_{A1, adj, (1 hr)}$			Airblast Noise dB(L) peak	Ground vibration (mm/s)[2]
All residential receptors	Day	40	45	50	N/A	N/A	115[3]	5[3]
	Evening	40	45	50	55	N/A	N/A	N/A
	Night	35	40	40	55	50[4]	N/A	N/A

Table notes: N/A = not applicable 1. Noise below 200 Hertz 2. Peak particle velocity (millimetres per second) 3. Peak for nine out of any ten consecutive blasts 4. External noise level, assuming wide open windows (equivalent to 42dB(A) L_{Amax} indoor noise level)

Table 5-15 outlines the noise quality objectives at sensitive receptors for controlling background creep (i.e. cumulative impacts) relevant to the BNCOP.

Table 5-15 Noise quality objectives at sensitive receptors for the BNCOP component of background creep (Source: Table 19 from Appendix H of the submitted EIS)

Location	Background creep from the BNCOP [$L_{Aeq, (1 hour)}$ dB(A)]		
	Day	Evening	Night
Austin	34	31	28
Hoadley	37	31	31
Baralaba township	40	31	29

Four unattended noise loggers were deployed for a period of seven days in November 2013 to measure the existing background noise levels. Attended noise monitoring was also carried out in November 2013 to measure source noise data from the existing Baralaba Coal Mine equipment and machinery. Attended noise monitoring was also carried out in November 2013 at four representative locations to identify noise from existing industrial sources.

A digital terrain acoustic model was developed to simulate the BNCOP mining operation and predict the noise levels at relevant sensitive receptor locations. Noise modelling used the sound power levels from the equipment and machinery measured at the existing Baralaba Coal Mine to provide an accurate representation of the noise sources associated with the BNCOP mining operations. If relevant equipment wasn't available at the Baralaba Coal Mine, measurements from equipment at other coal mines in Queensland were used.

The EIS assessed four modelling scenarios based on progressive development of the BNCOP:

- Year 3 (2017)
- Year 7 (2021)
- Year 8 (2022)
- Year 11 (2025).

The four modelling scenarios represent the general progression of the mine in a north-westerly direction and were chosen to represent the various operational phases of the project likely to produce the highest noise levels at the sensitive receptors. The modelling results represent the worst case scenarios with all equipment operating at maximum noise levels simultaneously. Furthermore, the modelled scenarios did not take into account any noise

mitigation measures that could be applied to reduce the noise impacts of the project.

The acoustic model contains a blasting module that includes the effects of meteorology. This module was used to predict the blast noise and vibration at sensitive receptors.

The modelling results were used to predict the potential noise and vibration impacts of mining and blasting activities over the life of the project and to determine whether the noise quality objectives can be achieved. Mitigation, management and monitoring measures that would reduce the potential noise and vibration emissions during project operations, were developed to address any predicted exceedences and achieve compliance with the noise quality objectives.

5.10.7.2 Existing noise environment

Sources of noise from the surrounding environment primarily comprise:

- wildlife (insects, amphibians and birds etc., with seasonal variation)
- road-based traffic
- farming and grazing activities
- residential activity noise
- mine-related noise from the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine.

The existing noise levels are relatively low, consistent with a rural area. The day background noise levels are often quieter than the noise levels at night. Noise from the existing mining operation is audible at night, but not dominant. The dominant noise at night is usually insect-related, particularly during summer.

Table 5-16 summarises the median unattended background noise monitoring results that were undertaken in November 2013 at the sensitive receptors identified to be the most susceptible to project-generated noise impacts.

Table 5-16 Summary of median unattended background noise monitoring from 2013 for the BNCOP (dB(A)) (Source: Table 3-14 of section 3.6.2 of the submitted EIS)

Location	L_{A90} (15 minutes)			L_{Aeq} (15 minutes)				L_{A10} (15 minutes)		
	Day	Evening	Night	Average	Day	Evening	Night	Day	Evening	Night
Austin residence	26.2	37.8	33.6	42.6	39.7	47	43.9	40.4	48.3	45.3
Hoadley residence	29.2	38.3	37.5	46.9	46.4	44.9	44.6	48.2	47.4	45.5
East residence	28.0	36.5	36.9	44.2	41.7	49.8	44.0	41.2	50.7	45.3
Baralaba Bowls Club	34.9	38.4	35.5	44.2	44.8	45.2	41.4	47.8	47.3	43.5

Attended noise monitoring was also undertaken in November 2013. Attended noise monitoring was undertaken at the Hoadley residence without disturbing the residents or domestic animals. In order not to disturb the residents and domestic animals, particularly at night-time, road-side monitoring locations representative of the other sensitive receptors, were used, rather than at the residences themselves. Attended noise monitoring indicated that the proponent's existing mining operations were audible at the Hoadley residence and at Baralaba-Woorabinda Road South (representative of the Baralaba Bowls Club) at different times throughout the day. However, ambient noise was almost entirely dominated by seasonal environmental activity (representative of summer) that included insects and amphibians. On occasions at the Duaringa Baralaba Road North Mine Entrance (representative of the East residence) and at the Hoadley residence, mining noise was sufficiently elevated to be the dominant noise source. However, the East residence is owned by Cockatoo Coal and would not be occupied during peak project operations. Consequently, the East residence was not included in the assessment of potential noise impacts from the project.

A comparison of the background noise monitoring results with the noise quality objectives suggests that (with the exception of some day-time results) the noise quality objectives were generally exceeded for both L_{Aeq} and L_{A10} measurements based on windows being open. If the windows were closed the noise objectives would be met. A comparison of the background noise monitoring results suggests that the noise quality objectives for background creep were also generally exceeded.

5.10.7.3 Potential impacts

Year 3 (2017) of project operations was identified as potentially the most adverse of the four mining cases assessed and is considered representative of the worst-case noise generating conditions. In year 3 overburden dumps would be relatively low in height, spoil disposal would consist solely of out-of-pit dumping (i.e. there would be no noise reduction from in-pit dumping of spoil) and mobile plant would be used in exposed locations on, or close to, natural ground level, or elevated on spoil dumps. The Dudarko and Steindel residences are located approximately 6km and 12.5km north north-east respectively from the nearest proposed mining activities. The noise modelling predicted that all noise quality objectives during day, evening and night-time, in all modelled years would be met at these residences as shown in the noise contour maps presented in Appendix H of the EIS. The numerical results were not tabulated in the EIS. A summary of the unmitigated predicted noise levels at relevant sensitive receptors and a comparison with the noise quality objectives for year 3 of project operations (representing worst-case conditions) is shown in Table 5-17.

Table 5-17 Summary of predicted noise levels (dB(A) L_{Aeq}) at sensitive receptors and comparison with noise quality objectives for year 3 of operations (Source: Table 3-16 of section 3.6.3 of the submitted EIS)

Location	Day	Evening	Night	Night (with wind)
Austin residence	34.1	28.9	33.3	38.4
Hoadley residence	31.0	33.3	35.6	34.8
Baralaba township	26.2	31.2	33.8	30.0
House residence	27.1	29.4	32.7	31.2
Noise quality objective	**40**	**40**	**35**	**35**

Based on the modelling results, noise levels at all sensitive receptors during the day-time and evening for all modelled years are expected to comply with the noise quality objective of 40dB(A).

At night-time, noise levels at the Austin residence are predicted to exceed the night-time noise quality objectives in all modelled years with wind, and in years 7 and 8 without wind. At night time, noise levels at the Hoadley residence are predicted to exceed the night-time noise quality objectives in years 8 and 11 with wind, and in all modelled years without wind. At night-time, noise levels at the House residence are predicted to exceed the night-time noise quality objective without wind, in year 22. The noise mitigation measures proposed by the proponent to address the potential exceedences are outlined in section 5.10.7.4 of this report.

Airblast overpressure and vibration

For each of the modelled years the blasts were located along the centreline of the progressive pit and on the natural surface. However, no additional directivity factors were assumed so as to represent the worst case scenarios.

Based on the modelling results, airblast overpressure levels and ground vibration levels are predicted to meet the noise quality objectives at all sensitive receptors in all years modelled, without mitigation measures.

Low frequency noise

The model predicted low frequency noise levels (i.e. below 200Hz), without mitigation measures, at sensitive receptors for each of the representative years. Based on the modelling results, low frequency noise levels are predicted to meet the corresponding noise quality objective at all sensitive receptors in all years modelled, without mitigation measures.

Sleep disturbance

The sleep disturbance criterion was not modelled. However, the EIS determined that the noise quality objective for sleep disturbance would be unlikely to be exceeded at any location because the L_{Aeq} (i.e. steady sound level), when mitigation measures are implemented, is more than 10dB(A) lower than the sleep disturbance objective of 50dB(A) L_{Amax} and the maximum noise levels at sensitive receptors are unlikely to be 10dB(A) higher than the steady sound levels.

Cumulative noise

The model assessed cumulative noise impacts associated with product coal haulage to the TLO facility from the proposed Baralaba South Coal Project (BSCP). The modelling concluded that road traffic noise objectives would be met at all sensitive receptors. It should be noted that the BSCP is currently being assessed by a separate EIS

process under the EP Act.

5.10.7.4 Proposed mitigation, management and monitoring measures

To reduce noise emissions, the proponent would implement noise controls at the CHPP, including cladding and screens.

Mitigation measures to achieve the night-time noise quality objectives at sensitive receptors would include the implementation of operational controls, including the restriction of spoil dumping to within the pit. In year 3 of operations, when out-of-pit spoil dumping would be the dominant spoil disposal method, façade control options would be implemented at sensitive receptors, including the physical treatment of the residences to reduce indoor noise levels (e.g. double glazing windows, acoustic seals for external doors and the installation of split or ducted air-conditioning).

The proponent would also implement real-time noise monitoring at representative locations, in conjunction with meteorological monitoring, to assist in implementing the most effective operational noise controls.

Blasting would be undertaken in accordance with the noise and vibration management and monitoring measures specified in a blast management plan.

Coal haul trucks operating on the mine site and on the public road network would be maintained to comply with applicable Australian design rules, including limits on external noise generated.

The proponent would develop a coordinated monitoring program for the BNCOP, product coal road transport route and TLO facility. The coordinated monitoring program would be used to assist the proponent in gaining further understanding of seasonal and background conditions in the project area.

5.10.7.5 Major issues raised in submissions

EHP requested the proponent to provide further information about how the noise monitoring data would be used in real-time to effectively achieve night-time noise compliance at sensitive receptors. In response, the proponent stated that a real-time noise monitoring network with monitors set up between the BNCOP and sensitive receptors would be used in conjunction with an alarm system to alert mine staff to potential non-compliances at sensitive receptors, as well as quick access to meteorological data to determine if mining activities are responsible. A trigger action response plan would define staff responsibilities and outline the operational controls (e.g. equipment shutdown, relocation priorities etc.) to be implemented to reduce mine noise emissions. Periodic reporting would be used to identify trends and to develop additional operational control measures, if required. The additional information adequately addressed the issue raised by EHP.

EHP noted that the EIS presented background noise levels that were measured in November 2013 (representative of summer) when insect noise is relatively high. EHP requested the proponent to measure background noise levels during winter and take into account the variation of noise levels during night-time between winter and summer. In response, the proponent conducted supplementary attended and unattended noise monitoring at the same sites, during July and August 2014 (i.e. winter). The proponent noted that after the 2013 monitoring there was an increase in mining activities associated with the development of the Baralaba North/Wonbindi North Coal Mine.

The attended noise monitoring in winter identified that the existing mining operations were audible at all four background noise monitoring locations, at different times throughout the day. The proponent concluded that based on the winter monitoring results the noise quality objectives for the project would remain unchanged and would still be achievable.

Based on the 2014 monitoring results, the proponent revised the proposed noise quality objectives for background creep. A comparison of the former 2013 objectives and the updated 2014 background creep objectives are presented in Table 5-18.

Table 5-18 A comparison of the 2013 and 2014 noise quality objectives for the BNCOP component of background creep at sensitive receptors
(Source: Table 10 of Attachment 5 of Attachment A of the Supplementary Report (August 2014))

Location	Noise quality objectives (2013) [$L_{Aeq, (1\ hour)}$ dB(A)]			Noise quality objectives (2014) [$L_{Aeq, (1\ hour)}$ dB(A)]		
	Day	Evening	Night	Day	Evening	Night
Austin residence	34	31	28	34	29	28
Hoadley residence	37	31	31	35	28	28

Location	Noise quality objectives (2013) [$L_{Aeq, (1\ hour)}$ dB(A)]			Noise quality objectives (2014) [$L_{Aeq, (1\ hour)}$ dB(A)]		
	Day	Evening	Night	Day	Evening	Night
Baralaba Bowls Club	40	31	29	39	31	31

The proponent noted that for the major sensitive receptor area in Baralaba (represented by the Baralaba Bowls Club), the background creep objectives would be 1dB(A) lower in the day-time, the same for the evening period, and 2dB(A) higher at night-time. For the other two key monitoring locations (i.e. Austin and Hoadley residences), the results are within 3dB(A) of the previously calculated noise quality objectives. Based on the additional information from the proponent, EHP is unsure whether the proponent would be able to meet the revised background creep objectives, particularly during winter when background noise levels are relatively low.

EHP requested the proponent to provide information about what temperature gradient in Table 20 of Appendix H of the EIS was used to assess the noise impacts associated with temperature inversion effects at night-time. In response, the proponent stated, amongst other things, that the night-time modelling (both with and without wind) used a temperature gradient of 2.0 degrees per 100m, which is representative of a mild temperature inversion. The night-time temperature gradient used by the proponent is lower than what has been used to assess the temperature inversion impacts of other mines in the region and may have underestimated the number of predicted night-time noise exceedences at sensitive receptors (without mitigation). However, the night-time noise objectives should still be achievable with the implementation of the mitigation measures proposed by the proponent in section 5.10.7.4 of this report.

A number of public submissions raised concerns about potential noise impacts at private residences along the coal product haul road transport route. In response, the proponent noted that the impacts due to the project's use of the existing haul road route had been assessed and approved under a separate process. The proponent also referred to the noise modelling, which found that the noise quality objectives for the haul route are expected to be met at 20m from the road during the day-time and 70m from the road during the night-time, and that the closest private residence is approximately 80m from the road transport route. The proponent also referred to the cumulative noise assessment in the BNCOP EIS that took into account the additional noise impacts associated with coal haulage from the proposed Baralaba South Coal Project. That assessment concluded that noise quality objectives would be met at all sensitive receptors. A copy of the proponent's response was given to the public submitters and no further issues were raised in regard to this issue.

5.10.7.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR for the noise and vibration aspects of the project. The EIS adequately described the existing noise environment potentially affected by the project and the potential impacts of the project on the receiving environment.

The final TOR requires the proponent to provide sufficient evidence to show that the following performance outcomes that relate to noise can be achieved:

- sound from the activity is not audible at a sensitive receptor
- the release of sound to the environment from the activity is managed so that adverse effects on environmental values including health and wellbeing and sensitive ecosystems are prevented or minimised.

It should be noted that the performance outcome in the first dot point is not realistic for the project. The modelling results indicate that noise generated by the project would be audible at sensitive receptors during certain times of the day and night. However, the EA for the project would include noise limits at sensitive receptors that are consistent with the noise quality goals for health and wellbeing. The proponent has included proposed mitigation, management and monitoring measures in the EIS (summarised in section 5.10.7.4 of this report), that are expected to reduce noise levels at sensitive receptors and achieve the noise quality goals for health and wellbeing.

In order to meet the outcome in the second dot point, the proponent has committed to:

- implement a range of proactive and reactive noise mitigation measures on-site to reduce noise emissions at sensitive receptors
- undertake real-time noise monitoring to identify potential exceedences and implement operational noise controls
- construct noise reduction infrastructure at residences to prevent sleep disturbance.

While the noise modelling predicts some exceedences of the night-time noise quality objectives at some sensitive receptors, without mitigation measures, the EIS identifies that most of the noise estimates are conservative and are

likely to overestimate actual noise levels. While the potential influence of temperature inversions on night-time noise levels may have been underestimated in the modelling, the implementation of the proactive and reactive noise mitigation, management and monitoring measures proposed in the EIS are expected to sufficiently reduce noise levels to achieve compliance with the noise quality objectives for the life of the project.

The background noise monitoring results are generally lower in winter than in summer. Consequently, the proponent has amended the background creep noise quality objectives at sensitive receptors and has stated that even though the revised objectives are generally lower, they would still be achievable. Recommended draft EA conditions to prevent the project from contributing to background creep at sensitive receptors have been included in Appendix 1 of this report.

Potential noise impacts associated with off-site coal product road haulage and the construction and operation of the TLO facility have been assessed and approved under separate processes. These activities will be managed according to the noise conditions specified in the relevant approvals. Consequently, recommended noise conditions for these off-site activities have not been included in this assessment report.

There are no additional noise-related recommendations for the project.

5.10.8 Transport

A road transport assessment for the BNCOP was included in Appendix I of the EIS and was prepared in accordance with the DTMR (2006) Guidelines for Assessment of Road Impacts of Development. Section 3.7 of the EIS included a description of the existing road transport infrastructure, an assessment of the potential BNCOP road transport impacts on the local and regional road network, along with relevant mitigation measures and management for road transport. Key transport infrastructure relevant to the BNCOP (including the existing product coal road transport route, the approved variation to the road transport route, and the approved new TLO) is shown in Figure 5-10 and discussed in the following sections.

5.10.8.1 Road transport

Existing infrastructure and values

The Leichhardt Highway is a state strategic road extending from the Capricorn Highway in the north, near Westwood, to Goondiwindi in the south. The Leichhardt Highway is a two lane highway with a regulated speed limit of 100km/h, reducing to appropriate speed limits through towns. It extends from Rannes township in the north to Banana township in the south in the vicinity of the BNCOP, and connects with Baralaba-Rannes road to provide access to the Baralaba township. Baralaba-Rannes Road is a local road that connects Baralaba and the surrounding district to the Leichhardt Highway. It is a bitumen two lane road and has a posted speed limit of 100km/h, reducing to 60km/h in Baralaba. The Dawson Highway is a regional road connecting Gladstone in the east to Springsure in the west. The Dawson Highway is a two lane highway typically with a regulated speed limit of 100km/h, reducing to appropriate speed limits through towns. It connects with Theadore-Baralaba Road near Moura, which is the connecting road heading north towards the Baralaba township. Baralaba–Woorabinda Road is a two lane sealed road with a regulatory speed limit of 100km/h, reducing to 80km/h and 60km/h in Baralaba. Access to the BNCOP would be via Baralaba–Woorabinda Road.

The major roads that would be used for the project during operations are associated with hauling product coal off-lease to the new TLO facility, which has been approved to be constructed about 3km east of Moura. The existing product coal road transport route (known as the Middle Road haul road) extends from the existing Baralaba Coal Mine to the existing TLO facility on the southern side of the Dawson Highway about 10km east of Moura. The Middle Road haul road is approximately 60km long with posted speed limits varying from 60 kilometres per hour (km/h) in the Baralaba urban area to 100km/h in rural areas. The route consists of the following road sections:

- a private haul road from the existing Baralaba Coal Mine to Baralaba-Woorabinda Road
- Baralaba-Woorabinda Road and Dawson River crossing (DTMR bridge)
- Baralaba-Kooemba Road
- a private haul road between Baralaba-Kooemba Road and Baralaba-Rannes Road
- Baralaba-Rannes Road
- Theodore-Baralaba Road (Middle Road).

AB-triple road trains are currently used to transport product coal to the existing train load-out facility.

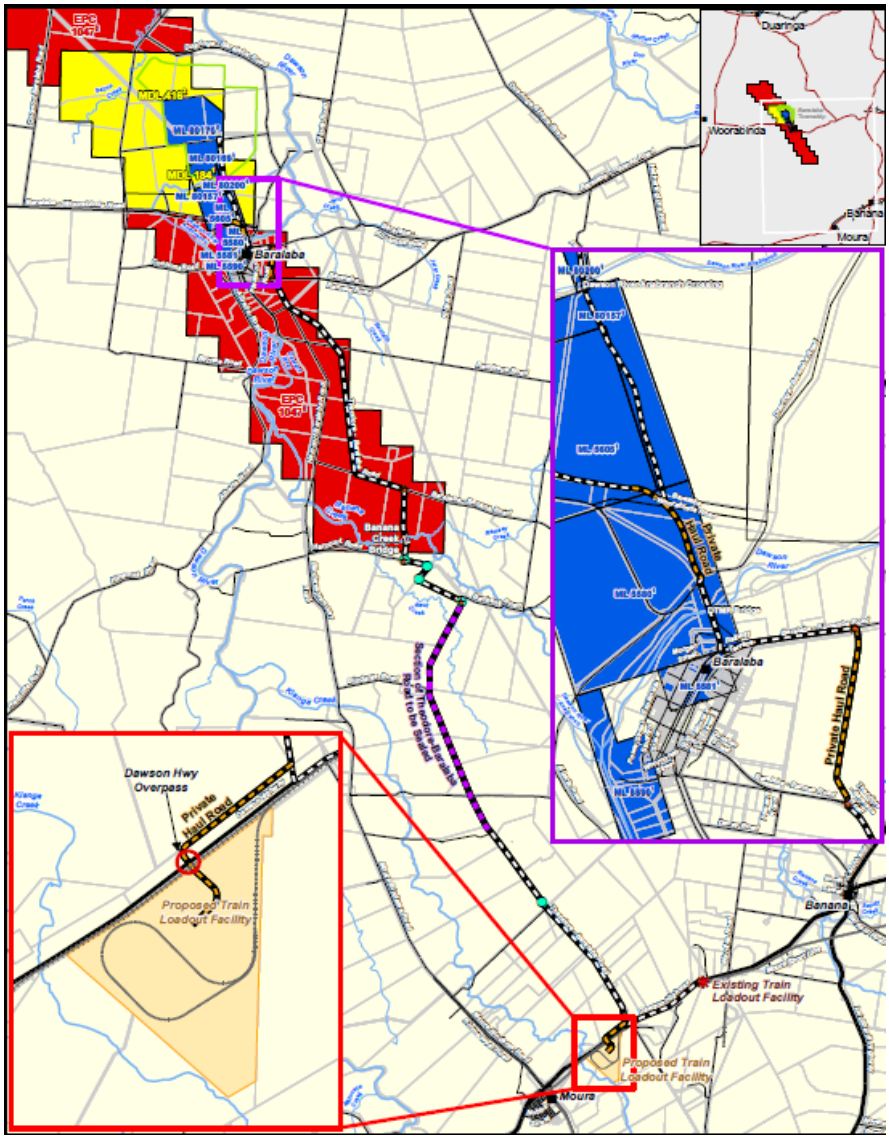
Existing road traffic volumes on the road network surrounding the BNCOP are low.

The existing level of service on the road network surrounding the BNCOP is rated A (i.e. the best traffic conditions, where drivers are unaffected by the presence of other drivers).

A review of DTMR road accident data in the vicinity of the BNCOP for the period July 2005 to June 2010 found that it was representative of typical rural road networks and no extraordinary trends were identified.

The proponent currently makes financial contributions to the Banana Shire Council and DTMR to assist in the maintenance of the roads in accordance with public road use agreements.

Figure 5-10 Approved variation to the existing product coal road transport route and approved new train load-out facility for the BNCOP (Source: Figure 2-19 of the submitted EIS)



Potential road transport impacts

The EIS provided a comparative assessment of the environmental, social and economic implications to landholders and the community of a number of alternative coal product transport methods. The assessment concluded that the preferred option would be to continue to use the existing coal product transport route, but with adjustments made to the road alignment to provide access to the new TLO facility located closer to Moura. Further information about the assessment of alternative transport methods is provided in section 5.2.1.3 of this report.

The continued use of the Middle Road for coal haulage would be through amended public road use agreements with Banana Shire Council and the Department of Transport and Main Roads (DTMR) in accordance with the Transport Operations (Road Use Management) Act 1995. Cockatoo Coal would also acquire ancillary works and encroachment approvals for state-controlled roads in accordance with the requirements of the Transport Infrastructure Act 1994 (TI Act) and the Transport Infrastructure (State-controlled Roads) Regulation 2006 required for transport of coal to the new TLO.

AB triple road trains would be replaced with AAB quad trucks to transport coal product from the BNCOP to the new TLO. Approximately, 96 round trips per day (e.g. 192 truck movement pass-bys) would be required over the life of the BNCOP.

A new access road connecting the Duaringa-Baralaba Road to the new MIAs and CHPP for the BNCOP would be constructed in accordance with DTMR requirements.

Table 5-19 shows the predicted additional traffic flows associated with the BNCOP during construction activities in Year 1 (2015) and operational activities in Year 12 (2027) on key roads compared with the estimated background traffic growth.

Table 5-19 Predicted cumulative average daily traffic during year 1 construction and year 12 operations (Source: Table 3-19 of section 3.7.3 of the submitted EIS)

Road	Construction Year 1 (2015)		Operations Year 12 (2027)	
	No BNCOP	BNCOP	No BNCOP	BNCOP
Leichhardt Highway				
North of Baralaba-Rannes Road	839	853	1,198	1,221
South of Baralaba-Rannes Road	839	864	1,198	1,232
Baralaba-Woorabinda Road				
Baralaba-Kooemba Road to Baralaba-Rannes Road	468	593	655	835
Baralaba-Kooemba Road to Duaringa-Baralaba Road	332	507	474	795
Baralaba-Duaringa Road to Fitzroy Developmental Road	186	188	266	269
Baralaba-Rannes Road				
Baralaba-Woorabinda Road to Theodore-Baralaba Road	462	484	659	690
Theodore-Baralaba Road to Leichhardt Highway	192	209	274	300
Baralaba-Kooemba Road				
Baralaba-Woorabinda Road to Mine haul road	110	160	157	299
Mine haul road to end	90	90	128	128
Duaringa-Baralaba Road				
Baralaba-Woorabinda Road to Mine access road	154	277	215	392
Theodore-Baralaba Road				
Baralaba-Rannes Road to Baralaba-Banana Road	480	535	672	818
Baralaba-Banana Road to Middle Road	372	375	521	613

With regard to the impacts of the BNCOP on road capacity, it is expected that for all locations the level of service on the road network would remain at rating A.

Assessment of the potential impacts of the BNCOP on the performance and safety of key road intersections in accordance with the DTMR Guidelines for Assessment of Road Impacts of Development (2006) found that impacts would be minimal.

5.10.8.2 Proposed road transport mitigation and management measures

Cockatoo Coal has identified a number of necessary upgrades to the coal product road transport route that are planned to support the existing Baralaba Coal Mine and Baralaba North/Wonbindi North Mine and also cater for the additional capacity requirements for the BNCOP. The upgrade works have been assessed and approved under a separate process, and would include:

- sealing the currently unsealed section of Theodore-Baralaba Road (approximately 12km in length) to a

width of 10m

- widening the Baralaba-Kooemba and Theodore-Baralaba Roads within the product coal road transport route to a sealed width of 10m (where required)
- constructing sealed private haul roads between Baralaba-Kooemba Road and Baralaba-Rannes Road, and adjacent to the Dawson Highway
- refurbishing the existing Banana Creek Bridge (e.g. adding supplementary members, strengthening split sections and tightening bolts)
- provision of an upgraded Banana Creek crossing and raising of the road level to achieve improved flood immunity
- refurbishing and replacing concrete floodways that are in poor condition along the product coal road transport route
- upgrading the following intersections subject to further detailed road impact assessment in accordance with the relevant Department of Transport and Main Roads guidelines:
    - Baralaba-Kooemba Road and a private haul road
    - Theodore-Baralaba Road and Baralaba-Banana Road
    - Theodore-Baralaba Road and Harcourt Road
    - Theodore-Baralaba Road and Backens Road
    - Theodore-Baralaba Road and Baralaba-Rannes Road
- curve widening approximately 1km of Theodore-Baralaba Road
- providing signage infrastructure to mitigate road safety risks along Theodore-Baralaba Road
- constructing the approved Dawson River Anabranch crossing
- raising the Dawson Highway and constructing a Dawson Highway Overpass to avoid interactions between haulage operations and public traffic on the Dawson Highway.

The following road transport management measures would be implemented:

- coal product haulage vehicles would be appropriately covered
- dangerous goods would continue to be transported along existing dangerous goods routes in accordance with relevant Queensland legislation
- oversized vehicles would have the relevant permits, licences and escorts as required by DTMR, and the proposed route would be negotiated with relevant local councils
- oversized vehicle loads would be appropriately secured and covered
- standard work instructions for interaction with school buses would be implemented and reviewed.

With regard to BNCOP traffic generated on roads other than the haul road, no intersection upgrades or additional mitigation measures were considered necessary.

The upgrades to the haul road should negate any significant impact on the safety and efficiency of the haul road network. With regard to road safety and efficiency on roads other than the haul road, the EIS stated that the BNCOP would result in no change to the type and rate of accidents.

Financial contributions would be made to Banana Shire Council and DTMR to assist with road maintenance.

5.10.8.3 Rail transport

All coal products from the Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine are currently hauled by truck to the existing TLO facility located within an existing Queensland Rail (QR) rail corridor on State owned land, about 10km east of Moura (Figure 5-13). A new TLO and rail loop facility to service the BNCOP was approved by the Coordinator-General of DSDIP and the Banana Shire Council on 20 August 2014. DOTE granted approval for the new TLO facility on 4 September 2014. The new TLO facility and rail loop facility would be located adjacent to the Dawson Highway about 3km east of Moura.

All coal products from the Baralaba Coal Mine and Baralaba North/Wonbindi North Coal Mine are currently loaded onto trains at the TLO and railed via the Moura Short Line to the RG Tanna Coal Terminal (RGTCT) and Wiggins Island Coal Export Terminal (WICET) port facilities for export. Coal products from the BNCOP would also be

transported via the Moura Short Line to the WICET at a rate of 3Mt/y and the RGTCT at a rate of 0.5Mt/y. The Moura Short Line is part of the Aurizon network and extends 151km to the RGTCT and WICET port facilities near Gladstone. Based on a standard train configuration, an average of one product coal train would be loaded per day for the BNCOP. However, to meet the required performance standards at the Port of Gladstone, a peak of up to four product coal trains per day may occasionally be required. Upgrades to the Moura Short Line to cater for the BNCOP were assessed and approved under a separate process and the upgrade works are currently being implemented.

5.10.8.4 Port/Sea transport

The RGTCT is located at the Port of Gladstone. All coal product from the existing Baralaba Coal Mine is currently exported through RGTCT at a rate of up to 0.5Mt/y. The existing coal resource at the Baralaba Coal Mine is anticipated to finish by the end of 2014 and the 0.5Mt/y of product coal exported through the RGTCT is proposed to be replaced by the BNCOP.

The WICET is located at Golding Point, to the west of the existing RGTCT at the Port of Gladstone. All coal product from the existing Baralaba North/Wonbindi North Coal Mine is currently exported through the WICET at a rate of up to 0.5Mt/y. Cockatoo Coal is party to the Wiggins Island Rail Project Deed with Aurizon Network Pty Ltd and has take-or-pay commitments to rail 3.0Mt/y of product coal to the Stage One export facility at the WICET. Consequently, the existing rate of 0.5Mt/y of product coal exported through the WICET is proposed to be increased to 3Mt/y of product coal produced by the BNCOP.

Cockatoo Coal is one of eight companies that comprise the users for the stage one development of the WICET. The Gladstone Port Corporation (a state-owned corporation) will operate the WICET on behalf of the WICET consortium. Based on a 180,000t cape-size shipping vessel, up to 20 ships would be loaded each year. In comparison, if 35,000t handymax size shipping vessels were used, up to 104 ships would be loaded each year.

5.10.8.5 Potential impacts and proposed mitigation measures

As no additional shipping movements (beyond those already approved at the RGTCT and WICET) would be required for the BNCOP, it is considered that there would be adequate capacity at the RGTCT and WICET to allow for the safe loading of coal products from the BNCOP. Consequently, no assessment of potential impacts associated with maritime operations under the Maritime Safety Queensland Guideline for major development proposals (DTMR, 2013) has been conducted for the BNCOP. Further, no specific sea transport mitigation measures are proposed to be implemented for the BNCOP.

5.10.8.6 Air transport

Rockhampton airport is the nearest major regional airport servicing the region. Rockhampton airport is a commercial business unit managed and operated by Rockhampton Regional Council. The Gladstone airport is also a major regional airport servicing the region and is operated by the Gladstone Airport Corporation. Biloela (Thangool) airport is a public airport operated by the Banana Shire Council. Airstrips for light aircraft also exist at Baralaba, Moura and Woorabinda. Brisbane airport is the nearest major city airport and is operated by Brisbane Airport Corporation.

5.10.8.7 Potential impacts and proposed mitigation measures

Approximately 25% of the construction and operational workforces (108 personnel at peak) for the BNCOP are expected to be employed on a FIFO basis from Brisbane. The BNCOP would increase the number of users of the Rockhampton, Biloela (Thangool) and Gladstone regional airports. The estimated incremental increases in the number of people using the regional airport services are summarised in Table 5-20.

Table 5-20 Estimated daily incremental increases of people using airports servicing the BNCOP (Source: Table 3-20 of section 3.7.5 of the submitted EIS)

Airport	Construction Year 1 (2015)	Operations Year 12 (2027)
Rockhampton	48	38
Gladstone	6	5
Biloela (Thangool)	6	5

Given the small increase in the numbers of people using regional airports for the BNCOP no specific air transport mitigation measures are proposed.

5.10.8.8 Major issues raised in submissions

DTMR and Banana Shire Council requested the proponent to implement the proposed mitigation measures through a revised road infrastructure agreement (RIA). In response, the proponent made a commitment to develop a revised road infrastructure agreement in consultation with DTMR (for State-controlled roads) and the relevant local council (for council controlled roads). Refer to the recommendations in section 5.10.8.9 for further details of the requirements of the revised RIA.

A number of public submissions raised concerns about the impact of additional haul road traffic on road safety at entrances to private residences. In response, the proponent referred to the road transport assessment in Appendix I of the EIS, which concluded that the accident history in the vicinity of the BNCOP was representative of typical rural road networks and the BNCOP would not result in any changes to the type and rate of accidents.

The proponent's response is a general statement and does not specifically address road safety at entrances to private residences. However, road safety along the coal product haul road transport route would be addressed in the RIA for the haul road upgrades, including an assessment of intersection performance and sight lines and an assessment of driver fatigue that might be a contributing factor to a potential accident.

A number of public submissions raised concerns about the impact of additional haul road traffic on the valuation of private residences. In response, the proponent referred to written advice received from two independent valuers that the values of properties located along the coal product haul road transport route are expected to be positively affected due to the proposed road upgrade works. That is, the proponent's response suggests that property prices should not be devalued as a result of the additional traffic on the haul route.

The major air quality-related and noise-related transport issues raised in submissions have been discussed in sections 5.10.6 (Air quality) and 5.10.7 (Noise and vibration) of this EIS assessment report respectively.

5.10.8.9 Transport conclusions and recommendations

All the off-lease transport infrastructure required for the project (including the haul road upgrades, Dawson Highway overpass, new TLO and Moura Short Line upgrades) has been subject to separate assessment and approval processes, with approval conditions under relevant legislation. Consequently, with one exception, recommended conditions for the off-lease transport infrastructure have not been included in this report. The only exception is coal dust management associated with the road and rail transport of coal from the project site. DTMR has advised that this issue has not been adequately captured by the conditions imposed in the separate approvals for the off-lease infrastructure, and there is also some overlap with the handling and transport of coal on the project site. Consequently, the coal dust management requirements have been included in the recommendations below.

DTMR requires the proponent to submit: a revised road impact assessment (RIA); road-use management plan (RMP); infrastructure agreement; and a series of associated documentation for the use and management of the non-haul related road infrastructure associated with the project. The proponent must also obtain relevant permits and licences for the use of the state-controlled road network. These requirements are outlined in the recommendations below.

Recommendations

At least 6 months prior to the anticipated commencement of the project:

1. submit a revised RIA that has been approved by an appropriately qualified person in accordance with the DTMR Guidelines for Assessment of Road Impacts of Development (2006) (GARID) including:
    a. an updated transport generation summary table (refer to the recommended spreadsheet in Appendix 3) detailing project-related traffic and transport generation information for state and local roads
    b. a pavement impact assessment using DTMR's pavement impact assessment tools
    c. an assessment of intersection performance and road safety (e.g. sight lines, adequacy of layout and design to accommodate the largest project vehicles)
    d. an assessment of the increased risk of worker/driver fatigue
    e. an assessment of how project-related road-use can be optimised to avoid school bus routes during peak operating times
    f. details of the final impact mitigation proposals, listing infrastructure-based mitigation strategies, including contributions to road works, rehabilitation, maintenance and summarising key road-use management strategies, including:
        i. ensuring the mine access to the public road is adequate to accommodate project construction and operational-phase traffic

   ii. designing and constructing connections from the private haul road to both the Baralaba-Kooemba Road and Baralaba-Rannes Road in accordance with local government and DTMR standards.

2. submit a road-use management plan (RMP) for the project that has been prepared in accordance with the DTMR Guide to Preparing a Road-use Management Plan, including:
   a. a table listing RMP commitments providing confirmation that all works and road-use management measures have been designed and will be undertaken in accordance with all relevant DTMR standards, manuals and practices
   b. optimised project logistics and minimised road-based trips on all state-controlled and local roads.

At least 3 months prior to the commencement of project construction:

3. formalise arrangements about transport infrastructure works, contributions and road-use management strategies required under the impact mitigation program by submitting an infrastructure agreement, or other means, for example, a co-signed schedule of works and contributions agreed to by road authorities and the proponent, as identified in the revised RIA. These arrangements must incorporate the following:
   a. project-specific works and contributions required to upgrade impacted road infrastructure and vehicular access to project sites as a result of the proponent's use of state-controlled and local roads by project traffic
   b. project-specific contributions towards the cost of maintenance and rehabilitation to mitigate impacts on state-controlled and/or local road pavements or other infrastructure
   c. performance criteria that detail protocols for consultation about reviewing and updating project-related traffic assessments and impact mitigation measures that are based on actual traffic volume and impacts, if previously advised traffic volumes and/or impacts change by 5% or more.

At least 3 months prior to commencement of significant construction works or project-related traffic generation:

4. submit detailed drawings of any works required to mitigate the impacts of project-related traffic to DTMR and the relevant local council/s for review and approval
5. obtain all relevant licenses and permits required under the TI Act for works within the state-controlled road corridor, including road works approvals (s. 33 of the TI Act), approval of location of vehicular accesses to state roads (s. 62 of the TI Act) and approval for any structures or activities to be located or carried out in a state-controlled road corridor (s. 50 of the TI Act)
6. obtain permits for any excess mass or over-dimensional loads for all phases of the project in consultation with DTMR's heavy vehicles road operation program office, and the relevant local councils in accordance with the *Transport Operations (Road Use Management) Act 1995*
7. finalise traffic management plans for the construction and commissioning of each site where road works are to be undertaken, including site access points, road intersections or other works undertaken in the state-controlled road corridor, in accordance with DTMR's Guide to Preparing a Traffic Management Plan.

In relation to road and rail transport of coal and managing coal dust emissions, the proponent must:

8. prepare a coal dust management plan comprising two parts:
   a. Part 1: control measures to effectively mitigate dust emissions from loaded and unloaded coal haulage trains when transporting coal via Aurizon's rail systems (e.g. Moura Short-Line) in accordance with the aims, objectives and mitigation measures specified in the Aurizon Coal Dust Management Plan (2010)
   b. Part 2: control measures to effectively mitigate dust emissions from vehicles during loading coal on-site and hauling coal from the project site to the train load-out facility on public roads in accordance with the DTMR Smart Practice Guide: Load containment requirements for haulage of coal on Queensland public roads (2014).

5.11 Assessment of routine matters

The routine matters discussed below are those aspects of the BNCOP that during project pre-lodgement discussions between EHP and the proponent, and from public submissions received during the public comment period on the draft TOR, were determined not to be critical matters discussed in section 5.10 of this report.

5.11.1 Land

The EIS adequately addressed the requirements of the final TOR for land associated with the BNCOP.

Section 4.1 of the EIS provided a detailed overview of the key land uses in the BNCOP area. Section 4.2 of the EIS

presented an assessment of potential visual impacts associated with the BNCOP. A detailed soils and land suitability assessment was undertaken, and presented in Appendix J of the EIS.

The proponent has applied to DNRM for a new mining lease, ML80201, for the extension of mining operations to the north and east of the existing operations at the Baralaba North/Wonbindi North Coal Mine.

Existing resource tenures overlying the project footprint are discussed in section 5.9.2.1 and shown in Figure 5 of this assessment report. The BNCOP area would be located within two existing petroleum tenures held by Arrow Energy Pty Ltd (EPP 831) and OME Resources Australia Pty Ltd (ATP 758). The granting of ML80201 is conditional upon the proponent negotiating coordination arrangements with Arrow Energy Pty Ltd and OME Resources Australia Pty Ltd under section 318CB of the MR Act. Arrow Energy Pty Ltd and OME Resources Australia Pty Ltd have drafted a letter of consent to the grant of ML 80201 which also establishes appropriate conditions for exploration activities, testing arrangements, data exchange and management of incidental coal seam gas as required under a coordination arrangement. The document has been finalised and is currently being signed by all parties.

Sections 5.9.2.3, 5.9.2.4 and 5.9.2.5 of this report discuss site topography, geology and landforms, and soil types and profiles, respectively.

5.11.1.1 Land use and suitability

The EIS adequately addresses the requirements of the final TOR for land use and suitability related aspects of the BNCOP.

Land in the Baralaba area is predominately used for rural activities including dairy farming, beef cattle grazing and fattening, and limited crop cultivation. Crops are generally restricted to providing forage for cattle, with *Leucaena* well established within the area. Exotic improved pastures dominated by Buffel Grass (*Cenchrus ciliaris*) are also common, while crops of cotton and wheat are produced on an opportunistic basis. The properties on which the BNCOP is proposed are consistent with the above land uses, and are used primarily for cattle grazing, with occasional cropping of *Leucaena* to provide cattle fodder. The current cattle carrying capacity for grazing on the BNCOP land is 1 animal per 2.5ha (i.e. the site has an approximate carrying capacity of up to 595 cattle). The full cattle herd is currently approximately 400 animals.

Assessment of dryland cropping suitability within the BNCOP area indicates pre-mining land suitability is predominantly unsuited to dryland cropping with only:

- 96ha suitable (Classes 2-3), 68ha marginal (Class 4), and 1,322ha unsuitable (Class 5) for dryland summer cropping
- 5ha suitable (Classes 1-3), 91ha marginal (Class 4) and 1,390ha unsuitable (Class 5) for dryland winter cropping.

The grazing suitability assessment did not identify any Class 1 land suitable for improved pasture fattening in the BNCOP area. However, all of the soils within the BNCOP area are capable of supporting some form of grazing, as indicated below:

- 365ha (24.5%) of land suitable for improved pasture development and capable of reliably fattening cattle in most seasons (Class 2)
- 310ha (21%) of land suitable for improved pasture development but limited to growing out younger cattle in most seasons (Class 3)
- 713ha (48%) of lower fertility land that is marginal for improved pasture development, but suited to year round breeding herd utilisation (Class 4)
- 98ha (6.5%) of sandy, infertile soils unsuitable for improved pasture development and limited to wet season breeding use only and requiring dry season de-stocking or co-access (Class 5).

Agricultural land class (ALC) mapping within the BNCOP area shows the following:

- 164ha is either crop land (Class A) or limited crop land (Class B)
- approximately 1,322ha is pasture land (Class C)
- no Class D land was identified within the BNCOP area.

A 132 kilovolt (kV) electricity transmission line (ETL) and easement owned and operated by Powerlink Queensland (Powerlink) traverses through the middle of ML80170 on Lot 6 on KM44, Lot 7 on KM44, Lot 11 on KM 46 and Lot 12 on KM46 (see Figure 2-1). The ETL would need to be relocated and is subject to separate assessment and approval under the *Electricity Safety Act 2002*. Construction of the new ETL would require an operational works approval from Central Highlands Regional Council (see recommendations below).

5.11.1.2 Potential impacts and proposed mitigation measures

Potential impacts of the BNCOP on soils and land suitability would relate primarily to:

- disturbance of soil resources within additional mining areas (e.g. development of the new open cut mining area)
- alteration of soil structure beneath infrastructure and roads
- possible soil contamination resulting from spillage of fuels, lubricants and other chemicals
- increased erosion and sediment movement due to exposure of soils during construction
- alteration of physical and chemical soil properties (e.g. structure, fertility and permeability) due to soil stripping and stockpiling operations.

Temporary alterations to landforms and topography as a result of the BNCOP would include the construction of roads, and water management and erosion and sediment control structures, including bunds/levees, dams and drainage features.

Permanent changes to topography and landforms would include:

- backfilling of the Baralaba Central Void and Baralaba North pit with spoil (behind the advancing open-cut operations)
- enlargement of the approved Baralaba North/Wonbindi North Mine spoil dumps
- spoil would be placed in other out-of-pit spoil dumps to a maximum height of 148m AHD
- one final void covering 145ha would remain at the cessation of mining.

Areas within the BNCOP area would be rehabilitated to either land suitability Class 4 (marginal suitability for dryland cropping and improved pastures and suitable for year round herd breeding) or land suitability Class 5 (unsuitable for dryland cropping, but suitable for wet season breeding).

The following areas would be rehabilitated to land suitability Class 4:

- the backfilled voids (i.e. in-pit spoil dumps);
- the upper surface of elevated landforms; and
- the slopes of infrastructure areas.

The slopes of the elevated landforms would generally range between 10 to 15% and be rehabilitated to land suitability Class 5.

Agricultural land resource management at the BNCOP would include the following key components:

- minimisation of disturbance to agricultural lands
- management of soil resources for use in rehabilitation
- inclusion of agricultural lands in the BNCOP rehabilitation strategy.

Proposed mitigation measures included:

- progressive rehabilitation of the spoil dumps
- elevated final landforms (e.g. spoil dumps) would be designed to be stable, revegetated with native species to control erosion, and allow the establishment of native trees and shrubs for nature conservation
- except where agreed in writing by the land owner, all infrastructure including water storage structures would be removed from the site after mining has been completed.

General soil resource management practices would include the stripping and stockpiling of soil resources for use in rehabilitation. Salvageable volumes of topsoil and subsoils are outlined in section 5.9.2.5 of this report. The following general management measures would be implemented for all stripped soils:

- topsoil materials should be stockpiled separately from subsoil based root zone media
- topsoil materials that potentially contain significant native seed should be segregated and stockpiled separately from cropping or pasture improved topsoil resources, which are likely to contain heavy loads of introduced pasture or weed seed
- topsoil stockpiles that potentially contain significant native seed should be used preferentially to maximize re-establishment of native species from available seed stores

- topsoil stockpiles containing predominantly surface soil material should ideally be formed no more than 1.5m in height, and should then be ripped and seeded with native species to stabilize and protect the material
- stripped materials (whether topsoil or root zone media) should be segregated into stockpiles that have similar reuse or textural characteristics. Soils with good surface physical characteristics should not be stockpiled with soils with poorer physical attributes
- root zone media should be salvaged from all disturbed areas where suitable material has been identified, and stockpiled separately from topsoil materials
- root zone media may be stockpiled to greater depths than 1.5m
- root zone material stockpiles should only be constructed in areas from which topsoil has first been stripped. Stockpiles should be ripped and seeded with native species to stabilize and protect the resource.

When managed in accordance with the topsoil management plan, there should be no significant limitations to the use of topsoil material in rehabilitation.

Surface runoff from the spoil dumps would be directed to sediment dams. If necessary, perimeter drains would be installed around the toe of the spoil dumps.

During mine operations, erosion and sediment control structures would be designed and installed in accordance with the Best Practice Erosion and Sediment Control (IECA, 2008) and Soil Erosion and Sediment Control Engineering Guidelines for Queensland Construction Sites (Institute of Engineers Australia [IEAust] [Qld], 1996).

Erosion and sediment control structures would not be removed until disturbed areas have been stabilised and there is at least 70% ground cover vegetation.

To create stable landforms, the design parameters of the elevated landforms are:

- outer slopes of no greater than 14.5% (approximately 1 in 7 slope)
- maximum effective slope length of 130m
- 10m wide drainage berms installed on side slopes (to limit effective slope lengths)
- vertical height of final landforms no more than 50m above pre-mining ground level
- gently sloped surfaces on the elevated plateau and shaped to direct water off the spoil dumps
- installation of erosion and drainage structures to direct water down the slopes and around the base of the spoil dumps into sediment dams
- soil placement and ripping on the contour
- application of an appropriate seed mix (such as pasture seed with a selection of native trees and shrubs) with fertiliser, if necessary.

5.11.1.3 Stock route network

The assessment of the stock route network found that no areas of travelling stock route occur within the BNCOP area, and the BNCOP would not have any impact on the stock route network. The Duaringa Shire and Banana Shire planning schemes relevant to the BNCOP identify that all stock routes located within 50km of the BNCOP are inactive or minor routes, apart from the Dawson Highway, which is a secondary route that would not be directly impacted by the BNCOP.

Given the lack of direct impacts and minimal indirect impacts, the cumulative impacts of the BNCOP on the travelling stock route would be negligible.

5.11.1.4 Strategic cropping land

The EIS adequately addressed the requirements of the final TOR for strategic cropping land (SCL) associated with the BNCOP. The BNCOP area lies within the western cropping zone (WCZ) of the strategic cropping management area under the now repealed *Strategic Cropping Land Act 2011* (SCL Act). SCL trigger mapping produced by DNRM indicates that the area of likely (or potential) SCL triggered by the BNCOP area is approximately 118ha. The triggered land is confined to the southern end of the BNCOP area, and is wholly contained within one property. The soil and land suitability assessment in Appendix J of the EIS followed the recognised standard land resource survey methodologies and analytical procedures, and concluded that 66.1ha of the decided SCL within the BNCOP area complies with all SCL requirements. The remaining 51.9ha of likely (or potential) SCL does not.

A SCL protection decision (SCLRD2013/000161) was granted in relation ML80169 and ML80170 and the subsequent SCL mitigation amount has been paid by the proponent to allow disturbance of SCL within ML80169 and ML80170.

As part of the rehabilitation monitoring program, the proponent would monitor areas designated to be returned to SCL against the SCL criteria defined in the SCL Act for the WCZ.

5.11.1.5 Priority agricultural areas

The *Regional Planning Interests Act 2014* (RPI Act) commenced on 13 June 2014 and includes a process for assessing resource projects for impacts on priority agricultural, priority living, strategic environmental and strategic cropping areas. The RPI Act replaces the requirements for assessing SCL under the now repealed SCL Act.

The areas of SCL within ML80169 and ML80170 are not subject to a Regional Interests Development Approval (RIDA) under the *Regional Planning Interests Act 2014*. However, the BNCOP area on ML80201 was not considered as part of the assessment of SCL under the SCL Act, discussed above. It is however located within zones identified and mapped as priority agricultural areas (PAA) under the Central Queensland Regional Plan. PAAs are identified in the Central Queensland Regional Plan as comprising the region's strategic areas of highly productive agricultural land uses. The BNCOP would result in the disturbance or alteration of existing agricultural lands (see section 5.11.1.1). Consequently, on 20 June 2014 the proponent lodged the BNCOP Regional Interests Development Approval (RIDA) application under the *Regional Planning Interests Act 2014* with DSDIP. The RIDA application explored the PAA co-existence criteria and also how the BNCOP satisfies the PAA co-existence criteria. On 27 October 2014 DSDIP granted Cockatoo Coal a regional interests development approval under the *Regional Planning Interests Act 2014*. The approval was granted subject to a number of conditions about financial mitigation and agricultural offset areas.

5.11.1.6 Native title

The EIS stated that Native Title has been extinguished over all lots within the BNCOP area under sections 15 and 23C of the Commonwealth *Native Title Act 1993* due to freehold grants.

5.11.1.7 Contaminated land

Appendix K of the EIS presented a contaminated land assessment of the BNCOP area. A stage 1 preliminary site investigation was prepared in accordance with the Guidelines for Contaminated Land Professionals. The site investigation included an assessment of the history of the BNCOP area, contaminated land database search, site inspection and soil sampling. No records on the Environmental Management Register (EMR) and Contaminated Land Register (CLR) were identified within the BNCOP area. No known or potential sources of contaminated land relevant to past land use have been identified within the BNCOP area.

5.11.1.8 Potential impacts and proposed mitigation measures

Carrying out the notifiable activities listed in section 4 of this report and/or inappropriate storage, handling and transport of chemicals, explosives and wastes has the potential to result in land becoming contaminated. Also, during the life of the BNCOP unexpected soil contamination may be identified from previous activities or inappropriate waste management practices associated with the project.

Measures used to prevent or reduce the potential for contamination of land from fuel, oils and chemical storage and associated waste products would include the following:

- hydrocarbon and chemical storage areas would be designed and bunded in accordance with Australian Standard (AS) 1940:2004 *The storage and handling of flammable and combustible liquids*
- spill kits located adjacent to all petroleum and chemical storage areas and mobile spill kits installed on service vehicles
- a register of spill kits would be maintained and all kits inspected for completeness at least quarterly
- training of appropriate staff in the prevention of spills and the use of spill kits
- explosives storage would be managed in accordance with AS2187:2006 *Explosives – Storage, transport and use*
- waste oil and other chemicals would be stored in contained areas to minimise contamination risk.

If unexpected contamination is identified, work would cease in that area and action would be taken to delineate the contaminated soil or fill material for management and remediation in accordance with the requirements of the EP Act.

5.11.1.9 Visual amenity

The EIS adequately addresses the requirements of the final TOR for visual amenity associated with the BNCOP. The area surrounding the BNCOP comprises a number of distinct land use types and landscape units of varying levels of quality which contribute to the environmental values of the area, including:

- agricultural areas in a rural setting
- Baralaba North/Wonbindi North Mine (including approved landforms)
- Baralaba Coal Mine (including rehabilitated landforms)
- Baralaba township
- residential dwellings
- local roads
- Dawson River
- Dawson River Anabranch
- Dawson River floodplain
- Saline Creek
- Northern Wetland
- Mount Ramsay (433mAHD at its summit)
- Dawson Range State Forest
- Redcliffe State Forest
- Roundstone State Forest
- Dawson River Conservation Park.

The methodology employed for the visual assessment included an analysis of the setting of the sensitive locations and assessment of the potential impacts associated with the BNCOP. The key factors considered as part of the visual assessment include sensitive land uses (e.g. residential areas, public roads and natural/recreation areas) and the visual form, scale and colour of the development.

5.11.1.10 Potential impacts and proposed mitigation measures

The potential visual impacts were assessed by evaluating the level of modification of the development in the context of the visual sensitivity of relevant surrounding land use areas from which the BNCOP may be seen. Table 5-21 summarises the results of the visual assessment undertaken for the BNCOP.

Table 5-21 BNCOP visual impact assessment (Source: adapted from Table 4-6 of the submitted EIS)

Viewing location (distance)	Viewer sensitivity	Development simulation year	Visual modification	Impact	Impact after final rehabilitation
Rider dwelling (>5km)	Low	11	Low	Low	Very Low
Olinda road (~5km)	Low	7	Low	Low	Very Low
Hoadley dwelling (~1.5km)	High	15	Moderate	High	Moderate
Austin dwelling (<1km)	High	7	Low	Moderate	Low
Duaringa-Baralaba Road (<1km)	Low	7	High	Moderate	Low

The cumulative visual impacts as a result of the BNCOP and surrounding operations are expected to be low.

Progressive rehabilitation would be implemented at the BNCOP, gradually reducing the contrast between the landforms of the BNCOP and the surrounding landscape. Rehabilitation activities would include planting of native tree and shrub species consistent with those found in other elevated landforms in the region.

The proponent would implement a rehabilitation management plan, which would outline rehabilitation goals, objectives, indicators and completion criteria for the BNCOP.

Whilst ensuring the operational safety is not compromised, the proponent would seek to minimise light emissions from the BNCOP by selective placement, configuration and direction of lighting to reduce off-site nuisance. The proponent would take all reasonable and feasible measures, in consideration of AS4282:1997 Control of the obtrusive effects of outdoor lighting, to mitigate visual and off-site lighting impacts of the BNCOP.

5.11.1.11 Major issues raised in submissions

DNRM requested the proponent to provide information about the direct, indirect and cumulative impacts of the BNCOP on travelling stock routes. In response, the proponent advised that the BNCOP would:

- not have any direct impact on travelling stock routes
- have an indirect impact of increased traffic and haulage activity on the Dawson Highway (a secondary stock route)
- have a negligible cumulative impact on the travelling stock route.

The proponent also committed to implement appropriate management strategies for any identified impacts of the project to the travelling stock routes. The proponent also referred to the requirements in the TLO facility approval (which includes the works associated with constructing the Dawson Highway overpass) for the proponent to implement a number of management plans relating to road transport, including a stock movement interaction management plan.

Given that the travelling stock route network would not be directly impacted by the project, the proponent's response would seem adequate. Also, refer to the recommendations in section 5.11.1.12 of this report.

DSDIP and DAFF requested the proponent to provide details of the impact of the BNCOP on PAAs under the Central Queensland Regional Plan. In response, the proponent referred to the RIDA application under the *Regional Planning Interests Act 2014* that was approved on 27 October 2014.

Given that the RIDA approval defines the allowable impact of the project on PAAs and outlines the offset requirements, EHP considers that this issue has been adequately addressed.

DAFF requested the proponent to obtain approvals for the use or removal of any state-owned forest products or quarry materials on, or adjacent to, the BNCOP area. In response, the proponent stated that the BNCOP would not impact on state-owned forest products or quarry material. Nevertheless, the proponent also committed to notify DAFF if any state-owned forest products or quarry materials are proposed to be used for the BNCOP.

Given that the proponent does not intend to remove any forest products or quarry materials during project operations, EHP considers that the issue has been adequately addressed. Refer to the recommendations in section 5.11.1.12 for further details.

Powerlink raised concerns about their rights under the easement terms and conditions associated with the relocation of the ETL. In response, the proponent advised that a review of environmental factors would be undertaken by Cockatoo Coal for assessment and approval by Powerlink. The proponent also advised that they would grant an easement in gross benefiting Powerlink over the properties that the existing ETL traverses, so that Powerlink's rights under the easement terms and conditions would be maintained during the relocation of the ETL.

The procedure proposed by the proponent to maintain Powerlink's rights to the existing ETL corridor until the relocation process has been completed appears to be consistent with legislative requirements. Refer to the recommendations in section 5.11.1.12 for further details.

5.11.1.12 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to land use related aspects of the project. The EIS adequately assessed the stock route networks in the vicinity of the BNCOP, which found that no areas of travelling stock route occur within the BNCOP area. The EIS explained that the impacts of the project on strategic cropping land and priority agricultural areas have been addressed by approvals granted under relevant legislation. The EIS adequately identified the potential visual impacts of the project and proposed mitigation measures to minimise the potential impacts. The EIS did not identify any contaminated land listed on the relevant contaminated land registers. No native title rights were identified to exist over the project land.

The final TOR (consistent with schedule 5 of the EP Regulation) required the proponent to provide sufficient evidence to show that the following performance outcomes that relate to land can be achieved:

- there is no actual or potential disturbance or adverse effect to the environmental values of land as part of carrying out the activity

- activities that disturb land, soils, subsoils and landforms will be managed in a way that prevents or minimises adverse effects on the environmental values of land
- areas disturbed will be rehabilitated or restored to achieve sites that are:
    - safe to humans and wildlife
    - non-polluting
    - stable
    - able to sustain an appropriate land use after rehabilitation.
- the activity will be managed to prevent or minimise adverse effects on the environmental values of land due to unplanned releases or discharges, including spills and leaks of contaminants
- the application of water or waste to the land is sustainable and is managed to prevent or minimise adverse effects on the composition or structure of soils and subsoils.

In order to meet these outcomes the proponent has committed that:

- soils and subsoils would be stripped to the specific depths specified in the topsoil management plan to avoid using materials with undesirable physical and chemical characteristics in rehabilitation
- soil and subsoil stockpiles would be partitioned according to their unique physical properties and potential seed stock, and would be constructed to specific maximum depths to maintain the chemical and physical properties necessary for successful rehabilitation
- spoil dumps and the final void would be rehabilitated to specific heights, dimensions and slope angles to ensure final landforms that are safe, non-polluting and stable
- the majority of the disturbed land will be restored to its original agricultural use of grazing
- chemicals and wastes will be managed according to industry standards to prevent the release of contaminants to land and spill clean-up kits will be kept on-site and staff training will be provided to minimise any adverse effects of unplanned release or spills of contaminants.

In conclusion, upon review of the assessment of impacts and the proponent's impact mitigating commitments, it is considered the proponent has provided sufficient evidence in the EIS that the land performance outcomes can be achieved.

Recommendations

1. It is recommended that Cockatoo Coal consults with relevant levels of government, including DNRM and local councils, if impacts on stock routes are identified.
2. It is recommended that Cockatoo Coal consults with DAFF, if any State-owned forest products or quarry materials are proposed to be used for the BNCOP.
3. It is recommended that Cockatoo Coal consults with Powerlink Queensland and Central Highlands Regional Council regarding the relocation of the ETL traversing the BNCOP area.

5.11.2 Biosecurity

Section 4.3 of the EIS provides an outline of the key biosecurity related aspects of the BNCOP. Proposed weed management and declared animal control strategies were included in the terrestrial ecology and aquatic ecology assessment in Appendix A and Appendix B respectively, and in section 6 of the EIS.

Pasture weed species such as guinea grass (*Megathyrsus maximus*), buffel grass (*Cenchrus ciliaris*), sabi grass (*Urochloa mosambicensis*) and Noogoora burr (*Xanthium pungens*) are common in the local area.

5.11.2.1 Weeds of national significance and pest animals

Five weeds of national significance (WONS) were identified within the action area during field surveys:

- velvety tree pear (*Opuntia tomentosa*)
- fireweed (*Senecio madagascariensis*)
- lantana (*Lantana camara*)
- water stargrass (*Hymenachne amplexicaulis*)
- water hyacinth (*Eichhornia crassipes*)

The EIS stated that the following declared animals were recorded within the project area and in the surrounding habitats:

- European rabbit (*Oryctolagus cuniculus*)
- European hare (*Lepus europaeus*)
- Eeuropean red fox (*Vulpes vulpes*)
- feral cat (*Felis catus*)
- feral pig (*Sus scrofa*).

5.11.2.2 Potential impacts and proposed mitigation measures

Project activities that could spread weeds during construction and operation include the following:

- soil disturbance associated with excavation works
- vehicle movements and movement of soil
- disturbed areas (including those subject to rehabilitation) provide a substrate in which weed species may grow.

Project activities may provide increased refuge and scavenging resources (e.g. discarded food scraps) for declared animal species.

The following mitigation measures are proposed to control and limit the spread of weed and pest species:

- vegetation clearance procedures to minimise clearing to within defined areas and only as required
- progressive rehabilitation to minimise the available substrate for weed species to establish
- bi-annual weed and pest animal monitoring
- declared animal control strategies, including maintaining a rubbish free project site and baiting and trapping, if required
- weed management measures, including:
    - preventing the spread of weeds through washing down machinery when moving from weed infested areas
    - controlling existing weeds by physical removal and chemical application
    - mapping and monitoring weed infested areas to gauge the effectiveness of the prevention and control measures
- selective exclusion of cattle from the project site during the life of the project.

5.11.2.3 Major issues raised in submissions

EHP raised the issue of aquatic weed occurrence and management, especially in relation to the potential spread of aquatic weeds in wetlands in the vicinity of the project area. The proponent advised that preventative measures to be implemented to restrict the spread of both terrestrial and aquatic weeds around the BNCOP area would be detailed in a weed management plan, including specific measures to manage the spread of weeds in potentially affected wetlands. EHP agrees that the weed management plan is the appropriate mechanism for managing the spread of aquatic weeds and is satisfied with the proponent's response in regard to this issue.

DAFF noted that *paranthium* and *sporobolus* grasses are potential risks for introduction and spread within the project site and requested the proponent to provide proposed weed hygiene practices and preventative actions. In response, the proponent referred to the proposed weed management and declared animal control strategies proposed in section 6.1.3.1 of the EIS. The proponent also advised that weed control methods would be developed and implemented in accordance with those specified by DAFF guidelines (2014). DAFF were satisfied with the proponent's response and did not have any further comments in relation to this issue.

DAFF requested the proponent to discuss the potential for activities such as stockpiling of timber and soil to increase pest animal numbers on-site and how these risks would be managed. DAFF suggested that management strategies should be consistent with the priorities of the Central Highlands Regional Council and should consider the DAFF weed and pest animal guidelines. In response, the proponent referred to the proposed management measures outlined in section 5.11.2.2 above. DAFF were satisfied with the proponent's response and did not have any further comments in relation to this issue.

DAFF suggested that weed surveys and monitoring should be conducted more frequently than bi-annually. In response, the proponent referred to, amongst other things, the commitments in section 6.1.3.1 of the EIS to map weed control areas for follow-up inspection and management and develop more specific weed management controls in accordance with the DAFF guidelines (2014). DAFF were satisfied with the proponent's commitment to develop more specific weed management control methods in accordance with the relevant guideline and did not have any further comments in relation to this issue.

5.11.2.4 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to biosecurity related aspects of the project. Weeds and pest animals that pose a risk to biosecurity were adequately identified and suitable mitigation and management measures to control the spread of weeds and pest animals were included in the EIS.

There are no specific biosecurity related recommendations for the project.

5.11.3 Waste management

Section 4.4 of the EIS identified the potential waste streams that are likely to be produced over the life of the BNCOP. Section 4.4.2 of the EIS identified the anticipated volumes of each waste likely to be produced during the construction and operational phases of the project. Sections 4.4.3 and 4.4.4 of the EIS respectively outlined the potential impacts of the various waste streams, and the proposed impact mitigation, management and monitoring measures. Appendix E of the EIS provided the geochemical assessment of the spoil and coarse and fine coal rejects.

5.11.3.1 Waste streams generated by the project

The major wastes expected to be generated by the project include spoil excavated during mining and coal rejects materials (i.e. coarse rejects and slimes) produced during coal processing activities at the CHPP. Other wastes likely to be produced during construction and operations are outlined below.

Construction wastes

Construction waste streams would include the following:

- general waste (e.g. food scraps and non-recyclable plastics)
- green waste (e.g. grass, cleared timber and weeds)
- recyclable waste (e.g. plastics and steel cans)
- refurbishable items (e.g. pipes and fittings)
- regulated waste oils and grease from machinery and vehicle maintenance, and empty waste oil containers
- regulated waste chemicals, including acid (from batteries) paints, solvents, sealants and engine coolant
- regulated sewage waste from offices and workshops
- waste tyres from light and heavy vehicles.

Operational wastes

Operational waste streams would be similar to those produced during construction, except at increased quantities.

Initially during construction there would be temporary ablution blocks that would not be connected to a reticulated sewage system. Then, in the early stages of construction, a sewage treatment plant (STP) would be constructed at the MIA to treat all sewage produced at the BNCOP.

5.11.3.2 Potential impacts

The geochemical assessment of the spoil and coarse rejects and slimes produced during mining was used to assess the potential impacts from these major waste streams generated by the project. The worst case results were determined from an assessment of the geochemical characteristics of the spoil and coarse rejects and slimes (e.g. samples were pulverised to create a much higher surface area compared to spoil materials disposed in the field). The assessment concluded that there would be a low risk of environmental impact, based on the following results.

Spoil materials

- spoil is expected to generate alkaline, low-salinity, surface run-off and seepage following surface exposure
- total sulfide concentrations of spoil were very low with 161 out of 162 samples classified as non-acid

forming (NAF) and barren (i.e. ≤ 0.1%) with respect to sulfide concentrations

- total metal and metalloid concentrations in spoil were low (e.g. below the applied health-based guideline level C for soils (NEPC, 1999)). About one third of spoil samples tested had concentrations of total manganese that exceeded the applied ecological investigation level for this element (NEPC, 1999). Two spoil samples had slightly elevated concentrations of total arsenic and barium with respect to the applied ecological investigation levels for these elements (NEPC, 1999)
- soluble multi-element results indicate that some spoil materials may produce leachate containing slightly elevated concentrations of some elements (e.g. aluminium, arsenic and selenium) compared to ANZECC (2000) livestock drinking water quality guideline concentrations and aquatic ecosystem water quality guideline concentrations
- spoil materials analysed individually in the lab would be well mixed at spoil dumps, which is expected to result in concentrations of metals and metalloids in surface run-off and seepage below the applied water quality guideline concentrations
- most spoil has relatively low sodicity and is generally non-dispersive
- weathered spoil has a greater propensity to be dispersive, and spoil materials from the southern end of the pit are generally more sodic than from the northern end of the pit
- spoil materials mined later in the mine life, which would report to final landform surfaces and be used in rehabilitation activities, are generally non-sodic (or have low sodicity) and are non-dispersive

Coarse rejects and slimes

- coal rejects are expected to generate alkaline, low-salinity run-off and seepage following initial surface exposure
- approximately 70% of coal reject samples were classified as NAF and 30% as PAF or uncertain, with most of the PAF samples regarded as having a low capacity to generate significant acidity
- sulfide concentrations in coal reject materials was low, with over 50% of samples having total sulfide concentrations below 0.3% and 77% of samples having total sulfide concentrations below 0.5%
- total metal and metalloid concentrations in coal reject samples were low (e.g. below the applied health-based guideline level C for soils (NEPC, 1999)). A small number of samples had concentrations of total manganese and one additional sample had a total barium concentration that exceeded the applied ecological investigation levels (NEPC, 1999) for these elements
- soluble multi-element results indicate that some coal reject materials may produce leachate containing slightly elevated concentrations of some elements (e.g. aluminium, arsenic, molybdenum and selenium) compared to applied ANZECC (2000) livestock drinking water quality guideline concentrations and aquatic ecosystem water quality guideline concentrations
- the relatively small volume of coal reject materials generated during coal processing would be mixed with NAF and alkaline spoil during in-pit disposal
- small proportions of PAF coal rejects and/or elevated concentrations of soluble metals from isolated coal reject sources would be significantly diluted amongst the in-pit spoil material.

With regard to other wastes, potential impacts on environmental values may arise from spills and inappropriate storage or disposal of waste material generated during the construction and operational phases of the project, and would these impacts may include:

- land contamination
- groundwater and surface water contamination
- degradation of native flora and fauna habitat
- littering and reduced visual amenity
- hygiene and air quality (e.g. odour) issues from putrescible wastes
- increased vermin and spread of disease
- increased fire hazard
- risks to human health and safety.

5.11.3.3 Mitigation, management and monitoring measures

Spoil and coal rejects materials associated with the project would be managed generally in accordance with the existing waste management program for the Baralaba Coal Mine, which includes the following strategies:

- spoil would be initially stored in out-of-pit dumps and used for levee construction, and then backfilled within in-pit spoil piles behind the active mining pit
- spoil disposal control would be determined and dictated by the site geologists as part of the waste scheduling and day-to-day mining operations
- spoil used for construction activities would be limited to unweathered materials and where engineering or geotechnical stability is required, testing of construction materials would be undertaken to assess their potential to erode
- surface run-off and seepage from spoil dumps would be monitored against the water quality discharge parameters specified in the project EA
- geochemical assessment of actual coal reject materials from the CHPP would be undertaken during project operations to confirm the geochemical predictions made in the EIS
- coal rejects would be placed in the pit below the expected final groundwater level and would be buried by at least 5m of benign spoil within one month of placement to prevent coal rejects and associated run-off from reporting to final landform surfaces
- decommissioning, rehabilitation and final landform design of the backfilled pit and final void would be undertaken in accordance with a mine closure plan.

Other wastes generated on the project site would be managed according to the existing waste management program which has been developed according to the waste and resource management hierarchy outlined in the *Waste Reduction and Recycling Act 2011*. The proposed waste management measures would include the following:

- delivering raw materials in bulk form to minimise the generation of waste packaging
- limiting the amount of raw materials brought on-site to that which is required
- mulching green waste and stacking suitable timber for re-use during rehabilitation
- establishing a recycling program for recyclable wastes including paper, cardboard, scrap metal and air filters
- developing operating procedures to define the location and size of the waste storage areas, state how each type of waste should be managed, and explain how accidents, spills and other incidents on-site would be dealt with
- defining designated waste collection areas on-site to store wastes prior to disposal
- segregating wastes into general, recyclable and hazardous waste streams
- removing all general waste from site under the Banana Shire Council waste disposal scheme
- storing recyclable waste in bins for regular off-site transport by a licenced waste transport contractor for recycling
- storing regulated waste in bunded areas for regular collection by a licenced regulated waste contractor for transport to a licenced waste receiver for re-use, recycling or disposal
- stockpiling waste tyres according to the EHP operational policy
- monthly inspections of waste storage areas to ensure that all wastes are being appropriately stored and segregated
- waste production and management auditing to identify potential improvements in waste management practices
- having sewage from the temporary ablution blocks pumped out by a licenced contractor and transported to the local STP
- upon commissioning of the on-site STP, all sewage generated by the project would be treated on-site and returned to the mine water dam and process water dam for re-use
- sludge from the STP would be removed from the site by a licenced contractor and transported to a licenced

disposal facility.

5.11.3.4 Major issue raised in submissions

Queensland Health requested the proponent to describe the proposed management system for the treatment of sewage and safe re-use of recycled water on-site. In response, the proponent committed to testing the treated effluent on-site to ensure compliance with the standards for the quality of class A+ recycled water specified in section 18AE and Schedule 3C of the Public Health Regulation 2005, prior to transferring the recycled water to on-site storages for re-use. The proponent's response is consistent with the legislative requirements for the re-use of recycled water and is considered to adequately address the issue.

5.11.3.5 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to waste management related aspects of the BNCOP. The EIS adequately identified the potential impacts of the project that may occur due to inappropriate waste management practices and proposed adequate mitigation, management and monitoring measures to ensure that waste would be appropriately managed at the BNCOP.

The final TOR (consistent with schedule 5 of the EP Regulation) requires the proponent to provide sufficient evidence to show that the following performance outcomes that relate to waste management can be achieved:

- waste generated, transported or received is managed in accordance with the waste and resource management hierarchy in the *Waste Reduction and Recycling Act 2011*
- if waste is disposed of, it is disposed of in a way that prevents or minimises adverse effects on environmental values.

In order to meet these outcomes the proponent has committed to implement a waste management plan on-site that is consistent with the waste and resource management hierarchy options outlined in the *Waste Reduction and Recycling Act 2011*. Furthermore, off-site waste disposal would be undertaken by appropriately licenced waste transport and disposal contractors.

Spoil wastes from the removal of overburden during mining is the largest volume of waste that is proposed to be disposed of on-site. Spoil wastes have been assessed in the EIS as overwhelmingly NAF, with relatively low concentrations of metals and metalloids and negligible risk of developing acid, saline or metalliferous drainage. Some weathered spoil may have dispersive properties. However, most unweathered spoil, particularly from the northern end of the pit (which would be mined last), is expected to have low sodicity and be non-dispersive. As the shallower weathered spoil would be mined before the deeper unweathered materials, the weathered spoil would be disposed of in-pit, or be placed in the base of spoil dumps and be covered by unweathered spoil. Therefore, according to the EIS, weathered spoil (excluding topsoil) would not be placed on final landform surfaces to any significant extent, and should not pose significant management issues during rehabilitation or final landform design. Spoil used for final landform covering would primarily comprise unweathered Permian material, which has low salinity, generally low sodicity and low potential for dispersion. These rehabilitation and final landform design management principles are currently successfully adopted at the Baralaba Coal Mine and as spoil material from the BNCOP would have essentially the same geochemical properties, the current spoil management measures, outlined above, are expected to be successful at the BNCOP.

Coarse rejects and slimes produced from processing coal at the CHPP are also proposed to be disposed of on-site. The EIS states that up to 30% of the coarse rejects and slimes may have some degree of risk associated with potential acid generation. However, coarse rejects and slimes were determined to pose a low risk of environmental harm due to the generally low sulfide and metal concentrations within this material. Furthermore, coarse rejects and slimes make up less than 1% of waste material to be disposed of on-site. Consequently, when placed amongst alkaline NAF spoil, the magnitude of any localised acid, saline or metalliferous drainage, if it occurs, is likely to be small, and would be confined to the in-pit area. Therefore, it is stated in the EIS that the overall risk of environmental harm and health-risk of coarse rejects and slimes disposal is considered to be very low.

In conclusion, upon review of the assessment of impacts and the proponent's proposed impact mitigating commitments, management and monitoring measures, it is considered the proponent has provided sufficient evidence in the EIS that the waste management performance outcomes can be achieved.

Refer to Appendix 1 of this report for the recommended waste management conditions to be included in the draft EA for the project.

There are no specific waste management recommendations for the project.

5.11.4 Cultural heritage

Section 4.5 of the EIS identified the environmental values relevant to indigenous and non-indigenous cultural heritage in the vicinity of the BNCOP. Section 4.5.3 of the EIS described the potential impacts of the project on cultural heritage values and outlined proposed mitigation measures. Appendix L of the EIS presented a non-indigenous cultural heritage assessment taking into consideration the relevant principles and criteria contained in the Burra Charter and the *Queensland Heritage Act 1992*.

5.11.4.1 Indigenous cultural heritage

In 2005, an Aboriginal cultural heritage field survey and investigation report was completed for the Baralaba Coal Mine. The field survey covered the broader area of the BNCOP footprint. No Indigenous cultural heritage material was encountered during the survey. A search of the Aboriginal cultural heritage register and Aboriginal cultural heritage database was also undertaken to assist in determining if there were any existing records of Aboriginal cultural heritage in the area, including the BNCOP site. No records were identified.

5.11.4.2 Mitigation and management measures

The proponent has entered into a Cultural Heritage Investigation and Management Agreement (CHIMA) with the Gaangalu Nation People. The CHIMA was approved as a Cultural Heritage Management Plan (CHMP) pursuant to section 107 of the *Aboriginal Cultural Heritage Act 2003* by the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs on 12 August 2013. The CHMP provides for the engagement of the Gaangalu Nation People prior to the commencement of any ground disturbance works, which allows for an assessment of the cultural heritage values within the proposed area of disturbance, and for the development of appropriate management strategies.

5.11.4.3 Non-indigenous cultural heritage

A search of the following heritage lists did not identify any items of significance in the BNCOP footprint:

- World Heritage List
- National Heritage List
- Commonwealth Heritage List
- Queensland Heritage Register
- Local Heritage Register
- Register of National Estate (former)
- National Trust of Australia Register.

Five features of interest were identified during the assessment, which included four earthen banked dams and a telephone line. All five features would be directly impacted by the project. The four earthen banked dam sites were assessed as having no cultural heritage significance and no mitigation of these dams was considered necessary. The telephone line was assessed as having a low cultural heritage significance. Although the alignment of the telephone line and the relatively low height of the poles are of interest, the site was considered to be unremarkable and is unlikely to contribute significant information in relation to the evolution of the history of Queensland and has insufficient integrity to contribute significant information in relation to the history of the region.

5.11.4.4 Mitigation and management measures

The recording of the telephone line during the non-Indigenous cultural heritage assessment was determined by the non-Indigenous cultural heritage specialists to be a sufficient mitigation measure.

The EIS stated that that there is low potential for further historic places and items to exist within the BNCOP footprint. Consequently, it was concluded in the EIS that there are no other features of interest that require further management to mitigate the impact on cultural heritage values.

The proponent committed to demonstrating diligence whilst undertaking works on-site, particularly during any clearing or construction activities. All staff and contractors would be informed of their obligations to report to EHP any archaeological items as defined under the *Queensland Heritage Act 2003* that may constitute an important source of information about an aspect of the history of Queensland.

5.11.4.5 Major issues raised in submissions

No major cultural heritage issues were raised in submissions on the EIS for the project.

5.11.4.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to Indigenous and non-Indigenous cultural heritage. Indigenous cultural heritage on the project site would be managed according to the CHMP approved under the *Aboriginal Cultural Heritage Act 2003*. The non-Indigenous cultural heritage sites identified on-site have been recorded and due to the low significance of these sites, no further mitigation measures are proposed.

There are no specific indigenous or non-Indigenous cultural heritage recommendations for the project.

5.11.5 Social and economic

Section 4.6 of the EIS summarised the assessment of social related aspects of the project. Section 4.6.2 provides a description of the existing social values of the local and regional communities potentially affected by the project. Sections 4.6.3 and 4.6.4 of the EIS respectively addressed the potential impacts of the project on social values, and proposed impact mitigation measures and management and monitoring. Appendix M of the EIS provided a detailed social impact assessment.

Section 4.7 of the EIS summarised the economic assessment undertaken for the project. Section 4.7.2 provided a description of the existing economic values, including a summary of the existing local, regional and Queensland economies. Sections 4.7.3 and 4.7.4 of the EIS respectively addressed the potential impacts of the project on the local, regional and Queensland economies, and the proposed impact mitigation and management measures. Appendix N of the EIS provided a detailed economic impact assessment.

5.11.5.1 Assessment methodology

The social values of the local and regional communities and potential impacts of the project on the social values were determined through direct engagement with potentially affected stakeholders, and an analysis of potential impacts against the values of the existing social environment. The assessment of potential social impacts of the project was completed using an impact significance assessment methodology. In this approach, the significance of an impact is assessed by considering the sensitivity of a particular social value and the magnitude of a predicted impact.

The economic assessment considered the effect of a proposal on the economy in terms of specific indicators, such as gross regional output (business turnover), value-added, income and employment. The economic assessment was conducted at three different scales based on analysis of a local, regional and Queensland economies inputs-outputs table for 2011, developed by an economics specialist consultant.

5.11.5.2 Social and economic environmental values

The Baralaba community was determined to constitute the primary social and cultural area of influence for the social impact assessment. The secondary social and cultural area of influence was determined to consist of the Banana, Central Highlands and Woorabinda Aboriginal Shire local government areas.

Based on the stakeholder engagement and community consultation program, residents of the local Baralaba community placed a high value on maintaining a safe and healthy environment, and living in a quiet and friendly place was considered as the preferred environment in which to raise a family.

The local economy adopted for the BNCOP was the Banana Shire Council local government area. The combined Banana and Central Highlands local government areas were adopted as the regional economy for the BNCOP.

In terms of output and value-added, the coal mining sector and other mining sectors were determined to be the most significant sectors of both the local and regional economies. The most significant sectors for local and regional employment are the coal mining sector, sheep, grains and beef sector, retail trade sector and education sector. The coal mining sector, other mining sector, and education sector are the most significant sectors for local and regional household income.

Value-added for the local economy in 2011 (i.e. Banana local government area) is estimated at $1,431 million, comprising $489 million to households as wages and salaries and $942 million in other value-added contributions.

Value-added for the regional economy in 2011 (i.e. Banana and Central Highlands local government areas) is estimated at $5,045 million, comprising $1,657 million to households as wages and salaries and $3,389 million in other value-added contributions.

The mining sector and agricultural, forest and fishing sectors are of greater relative importance to the local and regional economies, than they are to the Queensland economy. While the manufacturing, building, trade and service sectors are of less relative importance to the local and regional economies, than they are to the Queensland economy. In terms of output and value-added, the coal mining sector and other mining sectors are the most significant sectors of both the local and regional economies.

5.11.5.3 Potential social and economic impacts

The social impact assessment identified the following potential positive and negative social impacts of the BNCOP:

- provision of employment and training opportunities (including opportunities for the Indigenous community)
- injection of wealth into the local and regional economies
- population growth, demographic change, and population decline upon project decommissioning
- land use changes
- changes in air quality
- an increase in noise and vibration
- increased demand for permanent and temporary housing in the local and regional community
- competition for labour between existing businesses and the BNCOP
- loss of training and employment opportunities upon decommissioning
- loss of local economic stimulus upon decommissioning
- implications for the capacity of social infrastructure and services to service the local and regional communities
- increased traffic and heavy vehicle volumes in Baralaba (including along the product coal road transport route)
- fear of major disasters or hazards, such as flooding
- changes to social cohesion.

The social impact assessment concluded that only the Dawson Mine, located approximately 45km south-east of the BNCOP has the potential to contribute to cumulative effects on the social impacts of the BNCOP. However, as the Dawson Mine had recently reduced its workforce by approximately 200 persons, any potential cumulative effects are considered to be positive (i.e. potential opportunity for re-employment in the region).

The potential impacts of the BNCOP on the local, regional and Queensland economies are summarised in Table 5-22.

Table 5-22 Potential impacts of the BNCOP on the local, regional and Queensland economies (Source: Table 4-11 of section 4.7.3 of the submitted EIS)

Direct and Indirect Output or Business Turnover (Annual)		Direct and Indirect Value Added (Annual)		Direct and Indirect Household Income (Annual)		Direct and Indirect Jobs	
Construction	Operations (Incremental)	Construction	Operations (Incremental)	Construction	Operations (Incremental)	Construction	Operations (Incremental)
Contribution to the Qld Economy							
$134M	$921M	$56M	$320M	$31M	$165M	422	2,460
Contribution to the Regional Economy							
$72M	$364M	$26M	$49M	$9M	$19M	184	472
Contribution to the Local Economy							
$65M	$341M	$23M	$39M	$8M	$12M	157	355

As evident in Table 5-22 the potential impacts of the project on the Queensland economy are expected to be substantially greater than for the local and regional economies, as more BNCOP and household expenditure would be captured, and there is a greater level of inter-sectoral linkages in the larger Queensland economy.

The BNCOP would create increased demand for labour during both the construction and operation phases. The BNCOP would create increased demand for accommodation during both the construction and operation phases.

As the local and regional economies are not at full employment and are open economies with potential to use labour resources that reside outside of these economies, the BNCOP is not expected to result in any significant reduction in economic activity in other sectors of the local and regional economies.

Where housing supply is insufficient to meet demand, even temporarily, this may lead to increased property prices and higher rent prices. While this may be seen as beneficial for property owners, it can adversely affect existing tenants, particularly those on lower incomes who can be priced out of the market.

The magnitude of the local and regional economic impacts of decommissioning of the BNCOP would depend on a number of inter-related factors at the time, including the movements of workers and their families, alternative development opportunities, and economic structure and trends in the regional economy.

5.11.5.4 Mitigation measures, management and monitoring

To address the anticipated social and economic impacts of the project, the proponent would implement a social impact action plan (SIAP) in accordance with the Queensland government's social impact assessment guideline. The plan would include mitigation and management measures for the following key components:

- community and stakeholder engagement, including strategies to build on the proponent's existing community and stakeholder engagement processes to facilitate the establishment of a working partnership with the communities in which it operates
- workforce management strategies for local recruitment and equal opportunity employment, and a partnerships with Skills Queensland to address skills gaps and training requirements
- local business and industry strategies to inform local business of the goods and service provision opportunities and raise awareness of the proponent's business vendor register and compliance requirements of business to secure contracts, and adoption of the Queensland Resources and Energy Sector Code of Practice for Local Content (Queensland Resource Council, 2013)
- housing and accommodation strategies to meet the accommodation requirements of the BNCOP, including the construction of workforce accommodation to reduce excess demand for short-term and long-term accommodation
- health and community wellbeing strategies to minimise existing and potential impacts upon residents of the community of Baralaba.

The SIAP would also include a monitoring framework to be applied throughout the life of the project so the proponent can determine whether the proposed actions are meeting identified objectives.

Prior to project decommissioning, the proponent would develop a demobilisation strategy in consultation with employees, contractors, state and local governments and other project partners. This strategy would address the economic sustainability of the Baralaba township during decommissioning and mine closure, including a plan for transitional employment to address loss of training and employment opportunities for the local community.

Cockatoo Coal would work in partnership with the Banana Shire Council, Central Highlands Regional Council and the local community so that the benefits of the projected economic growth in the region are maximised and impacts avoided or mitigated, as far as possible.

5.11.5.5 Major issues raised in submissions

The Department of Education, Training and Employment (DETE) requested the proponent to provide a workforce profile identifying the specific occupations of the life of the project. In response, the proponent included a new table in Attachment A of the Supplementary Report with a breakdown of the number of personnel within each occupation associated with the operational workforce for the project. DETE was provided with a copy of the additional information about the operational workforce and did not raise any further questions with regard to this issue.

DETE, DSDIP, Central Highlands Regional Council (CHRC) and the Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) requested the proponent to include strategies and programs for apprenticeships and traineeships, and employment development and training strategies for disadvantaged groups, including Indigenous people, people with a disability and women. In response, the proponent referred to the regional employment and training opportunity strategies proposed in Table 9.1 of Appendix M of the EIS, which included:

- advertising employment opportunities locally
- enhancing employment and training opportunities through the workforce management component of the SIAP (see proposed mitigation measures above)
- enhancing opportunities by investigating partnership arrangements with registered training organisations and relevant state and local agencies to identify opportunities, pathways and training needs.

The proponent also noted that the Woorabinda community was identified as one of the most disadvantaged communities in Queensland. Consequently, the proponent has identified specific strategies for development and training of the Indigenous people within the Woorabinda community, including collaborating with registered training organisations, state departments and local councils to maximise opportunities for local apprenticeships, Indigenous cadetships and positions for suitable local candidates. The proponent also referred to the proposed monitoring framework to determine whether the SIAP is being effective, and the commitment to prepare annual reports, which

amongst other things, would detail the outcomes achieved to date and outline recommendations for improving performance. DETE, DSDIP, CHRC and DATSIMA were provided with a copy of the additional information and did not raise any further questions with regard to this issue.

DSDIP and Queensland Health requested the proponent to clarify the nature of the complaints management policy for the project. In response, the proponent clarified that the complaints procedure at the BNCOP would be in accordance with their existing complaints management policy at the Baralaba Coal Mine, where Cockatoo Coal handles complaints about its operations. DSDIP was provided with a copy of the proponent's response and confirmed with EHP that the additional information adequately addressed their concerns. Queensland Health was also provided a copy of the response and did not raise any questions with regard to this issue.

DSDIP requested the proponent to clarify the proposed strategies to engage with under-represented and/or disadvantaged groups and outline the outcome of discussions held with stakeholders regarding the proposed management measures. In response, the proponent referred to their commitment in Appendix M of the EIS to implement stakeholder and community engagement strategies to ensure that under-represented and/or disadvantaged groups are engaged during the life of the project. These strategies would include, amongst other things:

- developing a community and stakeholder engagement plan that would be reviewed and updated annually
- maintaining a stakeholder register that would be updated on a bi-annual basis
- maintaining monthly community advisory group (CAG) meetings to facilitate collaboration and engagement within the community.

The proponent also referred to public consultation between September 2013 and April 2014 and community and stakeholder consultation outcomes from the CAG meeting minutes in section 1.4 and Attachment 3 of the EIS respectively. DISDIP was provided with a copy of the proponent's response and confirmed to EHP that the additional information adequately addressed their concerns.

DSDIP requested the proponent to provide details of the strategies to assist local businesses, including Indigenous businesses, with up-skilling relating to tendering for contracts and pre-qualifying for supply of goods and services. In response, the proponent referred to the local business and industry component of the SIAP, which amongst other things, would include developing a local content strategy in collaboration with local government and business networks and identifying potential business opportunities for Aboriginal parties in accordance with the CHMP. The proponent also committed to include strategies to assist Indigenous businesses with up-skilling when tendering for contracts and pre-qualifying for supply of goods and services. DSDIP was provided with a copy of the proponent's response and confirmed with EHP that the information adequately addressed their concerns.

A local business owner raised concerns about potential impacts of the project on the business centre of Moura. A local interest group raised concerns about the potential impacts of the project competing for labour with the agricultural industry. In response to these issues, the proponent stated that the major impacts of the project on business centres would be through competition for labour. However, the social impact assessment in Appendix M of the EIS concluded that the project would be unlikely to have a substantial effect on the availability of labour for local businesses because the majority of local businesses are relatively small, are family owned and employ few additional staff. In regard to competition for labour with the agricultural industry the proponent referred to Appendix M of the EIS which concluded that due to the project's shift schedule of seven days on and seven days off, mining and agriculture can co-exist because it allows mining staff involved with agricultural production to progress agricultural operations when not on shift. The proponent also referred to, amongst other things, the proposed measures to mitigate competition for labour, which were included in the SIAP. A copy of the proponent's response was given to the local business owner and interest group and no further questions were raised with regard to this issue.

A local business owner raised concerns about the proximity of the new TLO facility to schools and grain handling and cotton gin facilities. In response, the proponent referred to the separate state and Australian government assessment and approval processes for the TLO facility, which assessed the potential impacts of the facility. A copy of the proponent's response was given to the local business owner and no further questions were raised with regard to this issue. EHP has not re-assessed the potential impacts of the approved TLO facility as part of this EIS process.

The Construction, Forestry, Mining and Energy Union (CFMEU) requested the proponent to include vehicle maintenance and servicing on the local supplies list for the project. In response, the proponent referred to the commitment in the SIAP to develop a local content strategy in accordance with the Queensland Resources and Energy Sector Code of Practice for Local Content (QRC, 2013). The proponent also confirmed that the strategies for up-skilling relating to tendering for contracts and pre-qualifying for supply of goods and services would include vehicle maintenance and servicing companies. A copy of the proponent's response was given to CFMEU and no further questions were raised with regard to this issue.

5.11.5.6 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to the social and economic aspects of the project. The EIS adequately described the potential impacts of the project on the social environment, as well as the local, regional and Queensland economies, and proposed impact mitigation and management measures to minimise these impacts, including providing employment and business opportunities to affected communities.

There are no specific social and economic recommendations for the project.

5.11.6 Hazards and safety

Section 4.8 of the EIS outlined the potential hazard and safety risks associated with the BNCOP. The environmental values potentially affected by the project are included in section 4.8.2 of the EIS. The potential hazard and safety impacts of the project and proposed mitigation measures are outlined in sections 4.8.3 and 4.8.4 of the EIS respectively. Appendix O of the EIS provided a preliminary risk assessment undertaken in accordance with the relevant risk assessment guidelines.

5.11.6.1 Environmental values

Sensitive receptors potentially affected by the hazards and risks associated with the BNCOP were identified based on a consultation with stakeholders and a review of aerial imagery surrounding the project and are consistent with the sensitive receptors identified for the air quality and noise and vibration assessment discussed in section 5.10.6 and 5.10.7 of this report respectively. Locations identified as sensitive receptors include:

- the Baralaba township, which is supported by a range of services, including the health care facility, police, school, hotel, café and sporting and recreational facilities
- residential dwellings within the vicinity of the project.

5.11.6.2 Potential impacts

A number of potentially hazardous materials and chemicals that may pose a risk to humans and the environment would be used during the project, including:

- diesel fuel
- lubricants, oils and greases
- sealants, solvents, paints and coolants
- explosives.

Natural events such as bushfires and floods that occur during project activities may also result in hazardous situations. The project may also contribute to off-site impacts of hazards by altering flood characteristics, altering the natural bushfire regime and contaminating waters in the receiving environment.

Another potentially risk during project operations may result from wildlife hazards, such as snake bite, animal attack or an outbreak of a vector-borne disease.

The preliminary hazard analysis found that with the implementation of mitigation and management measures the residual risks associated with all on-site and off-site hazards and safety risks identified for the project and surrounding land uses would be low. Consequently, the residual risks were determined to be tolerable and would not prevent the project from proceeding.

5.11.6.3 Proposed mitigation and management measures

The potentially hazardous materials and chemicals stored and used on-site would be managed according to the measures outlined in section 5.11.3 (Waste management) of this report.

Flood impacts on-site would be mitigated by the construction of appropriately designed flood protection levee banks. Off-site flood impacts as a result of the project were assessed to be negligible (see section 5.10.5 of this report).

The risk of bushfires would be mitigated by constructing and maintaining fire breaks and the provision of fire-fighting equipment on-site.

The risks of snake bite and animal attacks would be mitigated by providing staff with adequate personal protective equipment and awareness and first-aid training. Vector-borne diseases would be mitigated by managing the site to prevent the proliferation of rodents and other disease vectors.

The proponent would also develop and implement an emergency response plan in consultation with emergency services. The emergency response plan would identify the appropriate resources to ensure the safe and effective

management of emergencies at the BNCOP, including the following:

- injury (e.g. electric shock, high pressure injection etc.) and illness
- motor vehicle accidents
- fire
- tyre burst or fire
- unplanned initiation of explosives
- uncontrolled movement of equipment over an edge
- severe weather including flooding, lightening, bushfire and high winds
- loss of containment of hydrocarbons
- unapproved off-site discharges.

In the event of an injury or illness, Cockatoo Coal would have personnel trained in first-aid present on-site during each shift and first-aid rooms, facilities and equipment would be included on-site.

The existing risk management system for the Baralaba Coal Mine would be reviewed and expanded to include the activities of the BNCOP.

The Baralaba township is well equipped to respond to emergencies with a 24-hour operating ambulance station, Queensland fire and emergency services station, emergency airlift services and a hospital, including an emergency outpatients component.

5.11.6.4 Major issues raised in submissions

Queensland Health requested the proponent to provide information about how they would control and manage disease vectors (e.g. mosquitoes and vermin). In response, the proponent referred to Table 5 of Appendix O which lists the proposed preventative measures for managing mosquitoes and vermin, including:

Bite from disease vector (i.e. mosquitoes)

- provision of personal protective equipment when working outdoors
- workforce awareness training
- draining of standing water on-site.

Proliferation of rodents and other pests

- purpose designed waste management and transfer zones
- covering refuse bins to discourage vermin
- chemical control measures, where appropriate, to mitigate health conditions.

Queensland Health was satisfied with the proponent's response and did not raise any further questions with regard to this issue.

The Queensland Police Service (QPS) requested the proponent to incorporate into their planning crime-scene preservation requirements for incidents on-site that require a police investigation. In response, the proponent committed to incorporating crime-scene preservation requirements into the emergency response plan. QPS was satisfied with the proponent's response and did not raise any further questions in relation to this issue. Refer to the recommendation in section 5.11.6.5 of this report regarding consultation with QPS during the preparation of the emergency response plan/s for the project.

QPS requested the proponent to include evacuation procedures at camps and work-sites into the emergency response plan. In response, the proponent committed to including evacuation procedures in the emergency response plan. QPS was satisfied with the proponent's response and did not raise any further question in relation to this issue. Refer to the recommendation in section 5.11.6.5 of this report regarding consultation with QPS during the preparation of the emergency response plan/s for the project.

The Queensland Ambulance Service (QAS) requested the proponent to identify potential landing sites for both a rescue helicopter and fixed wing aircraft in the event of an emergency. In response, the proponent committed to providing the information to QAS during future consultation. QAS was satisfied with the proponent's response and did not raise any further questions with regard to this issue. Refer to the recommendation in section 5.11.6.5 of this report regarding consultation with QAS during the preparation of the emergency response plan/s for the project.

5.11.6.5 Conclusions and recommendations

The EIS adequately addressed the requirements of the final TOR with regard to hazard and safety risks associated with the project. The major hazards and risks were identified and suitable mitigation measures were proposed to minimise the potential impacts to people and property.

Recommendation

1. The proponent should prepare the emergency response plans for the project in consultation with relevant stakeholders, including the Queensland Police Service, Queensland Ambulance Service, Queensland Fire and Emergency Services and Banana Shire Council.

6 Recommendations about the suitability of the project

In this EIS process the detailed information compiled by Cockatoo Coal about the proposed BNCOP and the potential impacts of the project on the identified environmental values have been assessed by representatives of the Australian, state and local governments, industry, interest groups and members of the public through an open, public review process. The proponent has also met the EIS process requirements including notification, responding to comments and submissions as required by chapter 3 of the EP Act.

The EIS has complied with the requirements of the final TOR and has outlined a range of mitigation measures to avoid, minimise or offset adverse environmental, social and economic impacts. The majority of issues were covered satisfactorily in the EIS and in the proponent's responses to the submissions in the supplementary report. However, a number of additional actions are required to be completed, including the completion of various reports, plans and agreements to formalise the proponent's commitments in the EIS. These actions have been clearly outlined in the recommendations under each section of this EIS assessment report and should be fully implemented in consultation with relevant stakeholders.

Nevertheless, no issues of sufficient magnitude have been identified during the EIS process that would prevent the project from proceeding. Consequently, the project has been determined to be suitable to proceed.

7 Recommendations for conditions for any approval

7.1 Environmental authority approval

After the EIS process has been completed, the proponent would apply under chapter 5 of the EP Act to amend their existing EA to include the mining activities for the BNCOP. As required by section 59(d) of the EP Act, this report includes recommended draft EA conditions in Appendix 1. EHP's model mining conditions (EHP, 2013) and the model conditions for regulated structures (EHP, 2013) were considered in the development of the recommended draft EA conditions. All recommended conditions are considered necessary and desirable for the regulation of identified and potential environmental impacts determined in this assessment. Some of the recommended conditions are incomplete and would require finalisation prior to issue of the draft EA.

7.2 Mining lease approval

The proponent has applied under the *Mineral Resources Act 1989* to DNRM for a new mining lease (ML80201) on which the proposed mining activities would largely be conducted. The mining lease application is still subject to public notification, which would take place after the EIS process for the project has been completed. Consequently, DNRM is unable to prepare any conditions of approval for ML80201, until the public notification period has been completed.

7.3 Australian government approval

The proponent has referred the project to the Australian government Department of the Environment, which determined the project to be a controlled action, requiring approval under the EPBC Act. This report includes recommendations in sections 5.10.1.4 and 5.10.1.5 that must be completed by the proponent, before the Commonwealth Minister can make a decision about the approval. A copy of this report will be given to the Commonwealth Minister to assist with making a decision about the approval of the project and any conditions that should apply under Part 9 of the EPBC Act.

8 Approved by

L Delzoppo	03/11/2014.
Signature	**Date**

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