

Environmental Impact Statement (EIS) assessment report under the *Environmental Protection Act 1994*

Drake Coal Project proposed by Drake Coal Pty Ltd
(A wholly owned subsidiary of QCoal Pty Ltd)

Prepared by: Statewide Environmental Assessments, Department of Environment and Heritage Protection

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Table of Contents

1	Introduction	1
2	Description of the Project	2
3	The EIS process	6
3.1	EIS process timelines	6
3.2	Approvals	8
3.3	Consultation program.....	9
3.3.1	Public consultation	9
3.3.2	Advisory body	9
3.3.3	Public notification	10
3.4	Matters considered in the EIS assessment report.....	11
3.4.1	The final TOR.....	11
3.4.2	The submitted EIS	11
3.4.3	Properly made submissions.....	11
3.4.4	The standard criteria	12
3.4.5	Prescribed matters for EIS assessment report.....	13
3.4.6	Environmental Protection and Biodiversity Conservation Act 1999	13
4	Adequacy of the EIS in addressing the TOR.....	14
4.1	Introduction	17
4.2	Project need and alternatives	17
4.3	Project description	17
4.4	Climate	17
4.5	Land	18
4.5.1	Topography/geomorphology	18
4.5.2	Resource utilisation.....	18
4.5.3	Land use	19
4.5.4	Soil types and land suitabilities	19
4.5.5	Good quality agricultural land	21
4.5.6	Strategic cropping land	22
4.5.7	Land contamination.....	22
4.5.8	Land disturbance	22
4.5.9	Rehabilitation and decommissioning	23
4.5.10	Landscape character and visual amenity	24
4.6	Transport.....	25
4.6.1	Road.....	25
4.6.2	Rail.....	28
4.6.3	Ports.....	28
4.7	Waste	29
4.7.1	Excavated waste rock	29
4.7.2	Coarse rejects and fine coal tailings disposal.....	31

4.7.3	Excavated waste rock and fine coal tailings characterisation	32
4.7.4	Sewage waste.....	33
4.7.5	Other solid and liquid waste.....	33
4.8	Surface water resources	35
4.8.1	Identified surface water values	35
4.8.2	Potential surface water impacts and proposed mitigation measures	35
4.9	Groundwater resources	39
4.9.1	Identified groundwater values.....	39
4.9.2	Potential groundwater impacts and proposed mitigation measures	40
4.10	Air quality	42
4.10.1	Identified air environmental values	42
4.10.2	Potential air impacts and proposed mitigation measures	42
4.10.3	Greenhouse gas	44
4.11	Noise and vibration	45
4.11.1	Identified acoustic environmental values	45
4.11.2	Potential noise impacts and proposed mitigation measures	46
4.12	Ecology	47
4.12.1	Identified ecological values.....	48
4.12.2	Potential ecological impacts and mitigation measures	49
4.12.3	Biodiversity offset strategy	53
4.13	Cultural heritage.....	54
4.13.1	Indigenous cultural heritage.....	55
4.13.2	Non-indigenous cultural heritage	55
4.14	Social	55
4.14.1	Identified social values.....	55
4.14.2	Potential social impacts and mitigation measures.....	56
4.15	Health and safety	58
4.16	Economic	59
4.16.1	Identified economic values	59
4.16.2	Potential economic impacts and proposed mitigation measures	60
4.17	Hazard and risk.....	61
4.17.1	Potential hazard and risk impacts	61
4.17.2	Proposed hazard and risk mitigation measures	62
4.18	Matters of National Environmental Significance	64
4.18.1	Identified MNES	64
4.18.2	Impacts of the project on MNES	65
4.18.3	Offsets for MNES	67
4.18.4	Feasible project alternatives	68
4.18.5	Commonwealth Independent Expert Scientific Committee	69
	Points 1 to 3 of the IESC advice (Surface water-groundwater interaction and cumulative impacts)	70
	Point 4 of IESC advice (Proximity of co-disposal dam to the Bowen River)	71

Point 5 of the IESC advice (Flood protection and leachate from the initial co-disposal dam)	72
Point 6 of the IESC advice (Local and regional water quality impacts).....	73
Point 7 of the IESC advice (Cumulative impacts on downstream water resources)	73
5 Adequacy of the Environmental Management Plan (EM Plan)	74
6 Recommendations about the suitability of the project.....	75
7 Recommendations for conditions for any approval	75
7.1 Environmental Protection Act 1994 (EP Act)	75
7.2 Approvals under other legislation	75
8 Approved by.....	76
Appendix 1 - Requirements sought by the Department of Transport and Main Roads	77
Appendix 2 - Recommended conditions for the Drake Coal Project environmental authority (resource activities).....	79

List of tables

Table 1 – Mining pit rehabilitation and remaining surface area of non-beneficial land use
Table 2 – Projected areas of disturbance
Table 3 – Timeline for the Drake Coal Project EIS process
Table 4 – Approvals required for the Drake Coal Project
Table 5 – Changes to Queensland government departments
Table 6 – Summary of the EIS in addressing the TOR
Table 7 – A description of land units on-site and their use for rehabilitation
Table 8 – Land suitability ratings at the project site
Table 9 – Expected traffic generation to the project site during construction and operation
Table 10 – Waste rock descriptions, tonnages and percentages
Table 11 – Volume of lithological waste rock groups within each stratigraphic unit and corresponding number of samples analysed
Table 12 – Coarse reject and fine coal tailings tonnages and percentages
Table 13 – Impacted values and proposed strategic remnant offsets for the Drake Coal Project
Table 14 – Public health and safety values for the Drake Coal Project
Table 15 – Outputs from the EPBC Act offsets assessment guide impact calculator

List of figures

Figure 1 – Drake Coal Project location and mine layout
Figure 2 – Cross-section of levee buttress proposal around West Pit 1 final void
Figure 3 – Target coal seams for the Drake Coal Project
Figure 4 – Location of Twelve Mile Gully diversion and associated flood protection infrastructure
Figure 5 – Risk and significance matrix
Figure 6 – Consequence and likelihood definitions

List of acronyms and abbreviations

AADT	– average annual daily traffic
AEP	– annual exceedance probability
AHD	– Australian height datum
ANZECC	– Australian and New Zealand Environment Conservation Council
ARI	– average recurrence interval
ARMCANZ	– Agriculture and Resource Management Council of Australia and New Zealand
ASLP	– Australian standard leaching procedure
BCM	– bank cubic metres
BOS	– biodiversity offset strategy
CHMP	– cultural heritage management plan
CHPP	– Coal handling and preparation plant
DNRM	– Department of Natural Resources and Mines
Drake	– Drake Coal Pty Ltd
DSA	– design storage allowance
DSITIA	– Department of Sciences, Information Technology, Innovation and the Arts
DTMR	– Department of Transport and Main Roads
DWT	– Deadweight tonnes
EA	– environmental authority
EHP	– Department of Environment and Heritage Protection (formerly Department of Environment and Resource Management)
EIS	– environmental impact statement
EM Plan	– environmental management plan
EP Act	– <i>Queensland Environmental Protection Act 1994</i>
EPBC Act	– <i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	– environmentally relevant activity
ESA	– equivalent standard axle
GQAL	– good quality agricultural land
ha	– hectares
HEV	– high ecological value
IESC	– Independent Expert Scientific Committee (Commonwealth)NCA - <i>Nature Conservation Act 1992</i>
km	– kilometres
km/h	– kilometres per hour
kV	– kilovolts
m	– metres
MAW	– mine affected water
mg	– milligrams
MIA	– mining industrial area
ML	– megalitres
MNES	– Matters of national environmental significance
Mt/y	– million tonnes per year

NQBPC – North Queensland Bulk Ports Corporation port authority

PMF – probable maximum flood

QAS – Queensland Ambulance Service

QBOP – Queensland Biodiversity Offset Policy

RIA – road impact assessment

ROM – run-of-mine coal

SCL – strategic cropping land

SCR – state-controlled road

SEIS – supplementary environmental impact statement

SEWPAC – Department of Sustainability, Environment, Water, Population and Communities (Australian Government)

SPP – state planning policy

SPQ – single persons quarters

t – tonnes

TIA – *Transport Infrastructure Act 1994*

TOR – terms of reference

1 Introduction

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 Drake Coal Project proposed by Drake Coal Pty Ltd (Drake Coal). Drake Coal is a wholly owned subsidiary of QCoal Pty Ltd. The Department of Environment and Heritage Protection (EHP) (formerly the Department of Environment and Resource Management) coordinated the EIS process as the administering authority for the EP Act. This assessment report has been prepared pursuant to sections 58 and 59 of the EP Act.

The objectives of this assessment report are to:

- address the adequacy of the environmental impact statement and the environmental management plan;
- summarise key issues associated with the potential adverse and beneficial environmental, economic and social impacts of the Drake Coal Project and the management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project; and
- make recommendations on the suitability of the project to proceed and where so, to make recommendations on necessary conditions for any approval required for the project.

Section 58 of the EP Act lists the criteria that EHP must consider when preparing an EIS assessment report, while section 59 of the Act states what the content must be.

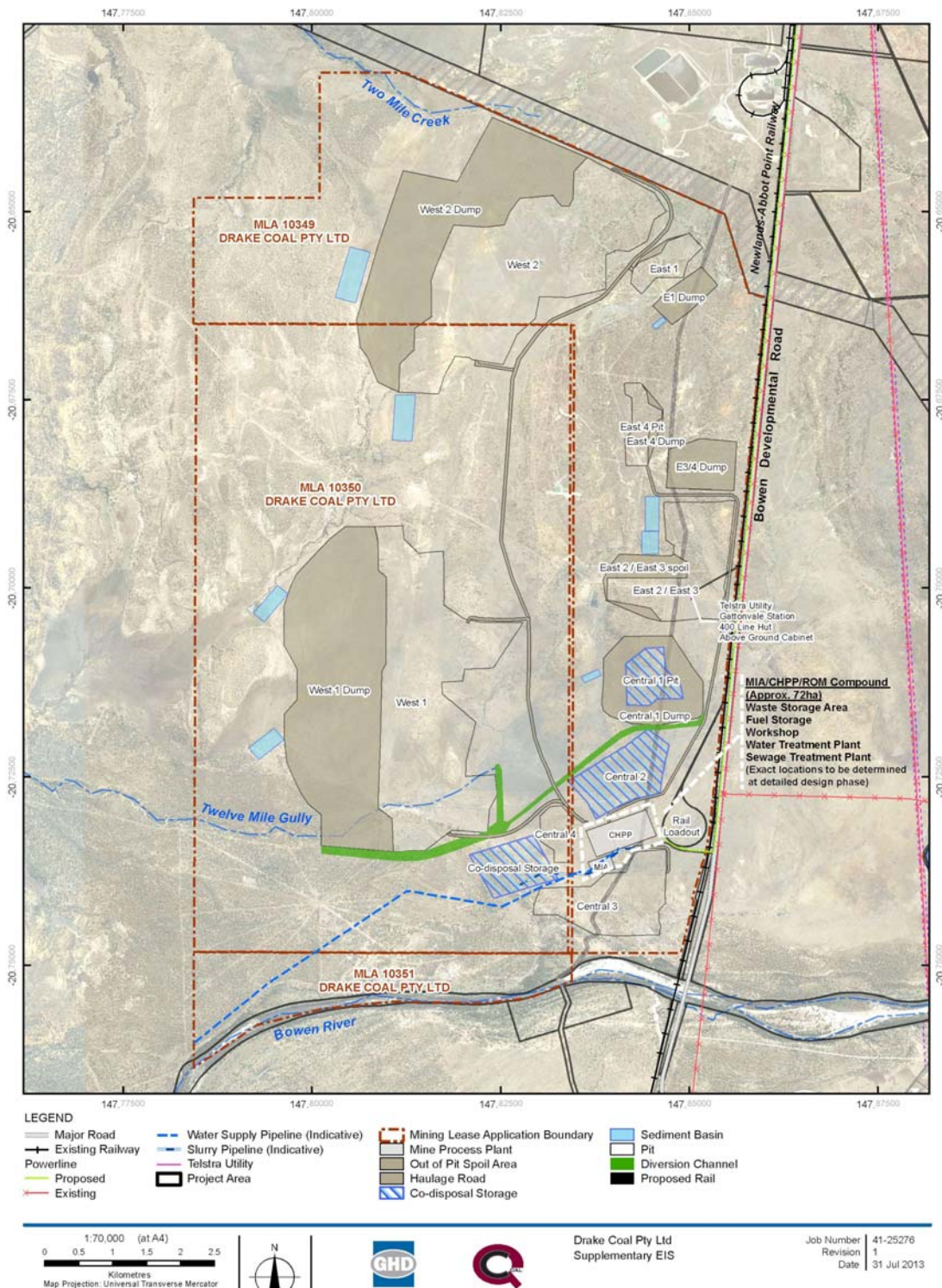
In summary, this assessment report addresses the adequacy of the EIS against the final terms of reference (TOR) and the suitability of the environmental management plan (EM Plan). It also discusses in some detail those issues of particular concern that are either not fully resolved or that require specific conditions to be included in subsequent project approvals.

The giving of this EIS assessment report to the proponent completes the EIS process under Chapter 3 of the EP Act.

2 Description of the Project

The proposed Drake Coal Project is a greenfield open-cut coal mine that would extract 10 million tonnes per year (Mt/y) of run-of-mine (ROM) coal and net 6Mt/y of coking and thermal product coal for export. The mine would operate 365 days per year for some 26 years. Coal would be processed at an on-site coal handling and preparation plant (CHPP) located within the mining industrial area (MIA) and transported by rail along the existing Newlands-Abbot Point Rail Line to the Port of Abbot Point for export using existing port facilities. A train load-out facility and balloon rail loop, connecting the project to the Collinsville-Newlands main line, would be constructed within the infrastructure compound (Figure 1).

Figure 1 - Drake Coal Project location and mine layout (Source: Drake Coal Project EIS)



The proponent for the project is Drake Coal Pty Ltd, a wholly owned subsidiary of QCoal Pty Ltd. The proponent has applied for Mining Leases 10349, 10350 and 10351 which are located within Lot 618 on PH2106 (land lease) and Lot 9 on DK239, covering a total area of 9196 hectares (ha).

The project would be located in the northern Bowen Basin of Central Queensland, approximately 150 kilometres (km) north-west of Mackay and 17km south of the Collinsville townships in the Whitsunday Regional Council local government area. The nearest private residence to active mining areas would be the Sonoma Homestead, located 3km to the north. Nine other residences are also located within 5km of the mine. The project area is bounded by Two Mile Creek to the north, the Bowen River to the south, the Bowen Development Road to the east and grazing to the west.

Mining would be by conventional diesel powered truck and excavator methods, involving the stripping of vegetation and the removal and stockpiling of topsoil and subsoil for later use in rehabilitation. Overburden and coal would progressively be removed from ten mining pits ranging in size from 29ha to 1101ha in area and between 20 metres (m) and 140m in depth. A dozer operation would be employed in pits of longer strike such as West Pits 1 and 2. In-pit blasting of coal and/or overburden may be required. The two main pits are West Pit 1 located in the south-west and West Pit 2 located in the north-west of the project site with surface areas of 1101ha and 987ha respectively. The remaining eight satellite pits (East Pits 1 to 4 and Central Pits 1 to 4) are scattered along, or near, the eastern boundary of Mining Lease 10349 and range in size from 29ha (Central Pit 4) to 216ha (East Pits 2/3).

Initial development would commence in West Pit 1, with the establishment of a boxcut and out-of-pit overburden dump. Mining would also commence in Central Pit 1 to provide in-pit storage by year three for co-disposal of coal tailings and coarse rejects from the CHPP. During the first ten years of operation pit development would be concentrated in West Pit 1, which would expand to full north-south strike length and progressively move to the east.

From year ten onwards mining would commence in Central Pit 2 and by year 11 West Pit 1 would be completed and mining would commence in West Pit 2. West Pit 2 would be the main production pit and would continue to be progressively mined down dip for the remainder of the mine life. The remaining pits would be progressively mined one after the other once Central Pit 2 has been completed.

Coal from each of the pits would be transported by truck via haul roads and stockpiled at an on-site ROM pad. From there it would be fed into the CHPP for sizing and processing at a nominal rate of 1400 tonnes (t) per hour. Reclaimed product coal would be discharged into a train load-out bin and loaded onto trains bound for the Port of Abbot Point for export. Tailings and coarse reject from the CHPP would initially be piped to an initial co-disposal dam located to the west of the CHPP. Additional tailings and coarse rejects material would be buried in-pit once suitable space was available, or buried within above-ground waste rock emplacements.

Overburden produced in the first few years would be trucked to an out-of-pit waste rock emplacement located west of the coal deposit adjacent to West Pit 1. Overburden waste rock would be progressively placed in-pit from approximately year three of operations.

Central Pits 1 and 2 and East Pits 2 and 4 would be completely backfilled (see changes to mine plan below). A total surface area of 458ha of final voids of varying size and depth would remain for the other six pits (see Table 1).

Table 1 - Mining pit rehabilitation and remaining surface area of non-beneficial land use

Mining pit	Void surface area (ha)	Void depth (m)	Void volume (Mm ³)*	Notes
West Pit 1	59	125	34	Operational levee around West Pit 1 would be buttressed by waste rock emplacement to above PMF level
West Pit 2	258	195	218	Void footprint is outside of the flood inundation area of any major watercourse
Central Pit 1	0	0	0	Void would be completely backfilled
Central Pit 2	0	0	0	Void would be completely backfilled
Central Pit 3	50	43	9.1	Void footprint is outside of the flood inundation area of any major watercourse
Central Pit 4	16	30	2.4	Void footprint is outside of the flood inundation area of any major watercourse

Mining pit	Void surface area (ha)	Void depth (m)	Void volume (Mm ³)*	Notes
East Pit 1	14	40	3	Void footprint is outside of the flood inundation area of any major watercourse
East Pit 2	0	0	0	Void would be completely backfilled
East Pit 3	61	115	25.3	Void footprint is outside of the flood inundation area of any major watercourse
East Pit 4	0	0	0	Void would be completely backfilled
Total	458		292	

Table Notes: *million metres cubed N/A - not applicable

Surface infrastructure would include demountable administration buildings, workshop area, a sewage treatment plant, site access via the Bowen Developmental Road, power supply and distribution, rail spur and balloon loop, accommodation buildings and water storage and management infrastructure.

A 33 kilovolt (kV) power transmission line would be constructed adjacent to the existing 33kV transmission line in conjunction with Ergon Energy.

The estimated water demand for the project at full production is 2300 megalitres (ML) per annum. The preferred water supply option is to capture overland flow and pump groundwater seepage and incidental rainfall from the mining pits to sediment dams and the initial co-disposal dam. An allocation of up to 2200ML/y from the Burdekin Falls dam has been obtained from SunWater and would be used to supplement any shortfalls in site water requirements.

Twelve Mile Gully is a defined watercourse under the *Water Act 2000* and would be permanently diverted around West Pit 1 and out-of-pit waste rock emplacement areas. A series of levee banks would be constructed around each of the ten mining pits to increase flood immunity during mining operations.

Amendments to the mine plan

The total area of surface disturbance was initially identified in the EIS that was released for public notification to be approximately 3442ha. However, a number of submissions were received on the EIS in relation to impacts on remnant vegetation and the location of infrastructure in the vicinity of the Bowen River and associated floodplain area. Consequently, Drake Coal presented a revised the mine layout in the Supplementary EIS to address these concerns and further mitigate detrimental impacts. The major changes to the mine layout include:

- relocating sediment basins for West Pits 1 and 2 to areas not containing remnant vegetation
- relocating the haul road route to avoid remnant vegetation, where possible
- a detailed analysis of the volume of material requiring disposal in the initial co-disposal dam and relocating the dam about 750m further away from the Bowen River, to a smaller footprint adjacent to Central Pit 4 (Figure 1)
- a detailed analysis of the volume of waste rock generated from West Pit 1 and amending the out-of-pit spoil dump footprint extent to avoid endangered vegetation communities
- amending and expanding the MIA/CHPP disturbance footprint area
- completely backfilling East Pit 4, as well as the northern area of West Pit 1, resulting in a smaller final void.

The changes to the site layout have resulted in a reduction of the overall project disturbance footprint by around 90ha. The revised disturbance footprint is now 3352ha. A breakdown of disturbance activities is shown in Table 2.

Table 2 - Projected areas of disturbance

Disturbance activity	Projected area (ha)	Major impact
Surface infrastructure (road, rail, plant)	259	Vegetation clearing and earthworks
Pit and spoil areas	2879	Vegetation clearing, earthworks, voids and dumps

Disturbance activity	Projected area (ha)	Major impact
Dams and surface water management	214	Vegetation clearing, earthworks and creek diversion works

3 The EIS process

3.1 EIS process timelines

The EIS process for the Drake Coal Project was conducted under Chapter 3 of the EP Act. Table 3 provides a timeline of the key steps undertaken during the EIS process.

Table 3 - Timeline for the Drake Coal Project EIS process

Step in the EIS process	Section of the EP Act	Responsibility for taking step	Statutory due date	Date completed
Application to voluntarily prepare an EIS was received by EHP	ss70 & 71	Proponent	N/A	6/04/2010
Decision to either grant or refuse approval to prepare a voluntary EIS was given to the proponent [approval granted]	s72	EHP	N/A	8/04/2010
Written notice of decision to approve preparation of a voluntary EIS was given to the proponent	s72	EHP	22/04/10	9/04/2010
The draft TOR accompanying the application to voluntarily prepare an EIS was determined to not be in the 'approved form' due to insufficient information requirements about the potential environmental, social and economic impacts of the project which did not 'allow the purposes of the EIS to be achieved for the project'	s40(a)(i) & s41(1) & (2)	EHP	N/A	30/04/2010
Letter given to proponent stating that the draft TOR was not in the approved form and outlining why the draft TOR did not allow the purposes of the EIS to be achieved	s41(1) & (2)	EHP	N/A	4/05/2010
New draft TOR submitted to EHP	s41(1) & (2)	Proponent	N/A	2/08/2010
Written notice about the draft (TOR notice) for public notification was given to the proponent including that the 'comment period' would be 30 business days	s42(1) & (2)	EHP	24/08/10	23/08/2010
The TOR notice was published in the Central Queensland News, Mackay Daily Mercury and in The Courier-Mail	s43(1)	EHP	28/08/10	27/08/10 & 28/08/2010
Copies of the TOR notice were given to interested and affected persons [no other persons were decided by the chief executive under s43(3)(c)]	s43(3)	Proponent	28/08/10	27/08/2010
The draft TOR comment period commenced on 30 August and concluded on 8 October 2010 [30 business days in total]	s42(3)	EHP	30/08/10 to 8/10/10	8/10/2010
Copies of all 12 sets of comments received during the 'comment period' were given to the proponent	s44	EHP	22/10/10	22/10/2010
The proponent gave advice to EHP in response to the 12 sets of comments	s45	Proponent	19/11/10	19/11/2010
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 Courier-Mail and Mackay Daily Mercury	s46	EHP	17/12/10	17/12/2010
The proponent submitted the EIS to EHP	s47	Proponent	17/12/12	30/09/2011
The decision period about whether to allow the submitted EIS to proceed to the notification stage was extended on multiple occasions from: 28/10/11 to 4/11/11; 4/11/11 to 20/01/12;	s49 & former s555 (extension of	EHP (at the request of the proponent)	23/03/12	23/03/2012

Step in the EIS process	Section of the EP Act	Responsibility for taking step	Statutory due date	Date completed
20/01/12 to 23/03/12; and 23/03/2012 to 20/04/2013; so that the proponent could amend the EIS to address the final TOR in an acceptable form	decision period)			
The proponent submitted a replacement EIS to EHP	s47	Proponent	20/04/12	23/03/2012
Decision was made that the EIS was suitable to proceed	s49	EHP	20/04/12	20/04/2012
Notice of decision that the EIS is suitable to proceed to public notification including that the submission period would be 30 business days was given to the proponent	s49(5)	EHP	8/05/12	8/05/2012
A copy of the EIS notice was given to interested and affected persons	s51(2)(a)(i) & (ii)	Proponent	5/06/12	10 & 11/05/2012
The EIS notice was published in The Australian, The Courier-Mail and the Bowen Independent newspapers	s51(2)(b)(i) & (ii)	Proponent	5/06/12	11/05/2012
The EIS submission period commenced on 14 May and concluded on 25 June 2012	s52(2)(a)	N/A	14/5/12 to 25/06/12	25/06/2012
Declaration of compliance was given to EHP 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 the relevant newspapers	s53	Proponent	25/05/12	24/05/2012
Twenty-two received and accepted submissions about the submitted EIS were forwarded to the proponent	s55 & 56(1)	EHP	9/07/12	9/07/2012
The period within which the proponent had to prepare a response to submissions was changed by agreement on multiple occasions from: 6/07 2012 to 26/10/ 2012; 26/10/2012 to 7/12/2012; and 7/12/2012 to 15/02/2013	s56(2) & (3)(b)	Proponent	15/02/13	14/02/2013
A response to submissions was received by EHP	s56(2)	Proponent	15/02/13	14/02/2013
EHP considered the submitted EIS and the proponent's response to submissions and decided not to allow the submitted EIS to proceed under divisions 5 (EIS assessment report) and 6 (Completion of process)	s56A(2)	EHP	14/03/13	14/03/2013
EHP issued the proponent a notice of decision, including the reasons for the decision, and that once the additional information was received EHP could reconsider the s56A decision	s56A(4)	EHP	28/03/13	28/03/2013
Additional information from the proponent was received by EHP on 15 April and 7 June 2013.	s56(2)	Proponent	N/A	15/04/13 & 7/06/2013
EHP repealed s56A(2) decision on grounds that it contained incorrect information and issued proponent an information request under s62 EP Act to obtain the additional information	s56A and s62 & s24AA <i>Acts Interpretations Act 1954</i>	EHP	8/07/13	5/07/2013
Proponent provided additional information in response to information request under s62	s62	Proponent	19/07/13	5/07/13 & 8/07/2013
EHP considered the submitted EIS, the proponent's response to submissions and the additional information provided under s62 and decided to allow the EIS to proceed under divisions 5 (EIS assessment report) and 6 (Completion of process)	s56(A) & s4 <i>Acts Interpretations Act 2004</i>	EHP	2/08/13	15/07/2013

Step in the EIS process	Section of the EP Act	Responsibility for taking step	Statutory due date	Date completed
A notice of the decision to proceed was issued to the proponent	s56A	EHP	29/07/13	29/07/2013
The proponent submitted an amended EM Plan together with an EIS amendment notice to EHP	s66	Proponent	N/A	31/07/2013
EIS assessment report completed and issued to the proponent completing the EIS process	ss57 to 60	EHP	10/09/13	10/09/13

3.2 Approvals

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

Table 4 - Approvals required for the Drake Coal Project

Approval	Legislation (administering authority)	Detail
Approval to undertake an action that may impact on a matter of national environmental significance (NES) nationally listed threatened species and ecological communities. Refer to section 4.15 for details	EPBC Act (SEWPAC)	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 (mining activities) (EA)	EP Act (EHP)	EIS process completed. EHP requires amendments to the submitted EM Plan and action with regard to some matters (see section 4). Recommended EA conditions are included in Appendix 2.
Granting of mining leases	<i>Mineral Resources Act 1989</i> (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 Leases 10349, 10350 and 10351
Water licence to interfere with the flow of water in a watercourse (diversion of Twelve Mile Gully)	<i>Water Act 2000</i> (DNRM)	Following completion of the EIS process the proponent would apply to DNRM for a water licence to divert Twelve Mile Gully. Conditions would be developed during the water licence approval process
Water allocation from the Burdekin supply scheme	<i>Water Resource (Burdekin Basin) Plan 2007</i> (SunWater)	The proponent has secured from SunWater a 2300ML/y allocation from the Burdekin Falls dam
Various road improvement, rehabilitation, maintenance and road use management approvals over the life of the project	<i>Transport Infrastructure Act 1994</i> and <i>Transport Operations (Road Use Management) Act 1995</i>	Refer to sections 4.6 and Appendix 1 of this report for further information about likely transport related approvals.

A granted EA for the project would allow the proponent to mine black coal and would also cover 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):

- ERA 8 Chemical storage
- ERA 15 Fuel burning
- ERA 16 Extractive and screening activities
- ERA 31 Mineral processing

- ERA 33 Crushing, milling, grinding or screening
- ERA 60 Waste disposal
- ERA 63 Sewage treatment.

The following notifiable activities being undertaken for the project would also be authorised under the EA:

- 1. Abrasive Blasting - carrying out abrasive blast cleaning or disposing of abrasive blasting material
- 7. Chemical storage - storing more than 10t of chemicals that are dangerous goods under the dangerous goods code
- 15. Explosives production or storage - operating an explosives factory under the *Explosives Act 1999*
- 24. Mine wastes
 - storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants
 - exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants
- 29. Petroleum product or oil storage.

3.3 Consultation program

3.3.1 Public consultation

In addition to the statutory requirements for advertising the TOR and EIS notices and the mailing of the notices to interested and affected parties, Drake Coal undertook community consultation with members of the public and other stakeholders during the public submission period of the EIS. Community information sessions and community values workshops have been conducted in Collinsville and the broader northern Bowen Basin region and have contributed to the social impact assessment for the project.

3.3.2 Advisory body

EHP invited the following organisations to assist in the assessment of the TOR and EIS by participating as members of the advisory body for the Drake Coal Project:

- Commonwealth Department of Sustainability, Environment, Water, Population and Communities
- Construction, Forestry, Mining and Energy Union
- Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
- Department of Agriculture, Fisheries and Forestry
- Department of Communities, Child Safety and Disability Services
- Department of Community Safety
- Department of Education, Training and Employment
- the former Department of Employment, Economic Development and Innovation (DEEDI)
- Department of Housing and Public Works
- Department of Local Government
- Department of Natural Resources and Mines
- Department of Sciences, Information Technology, Innovation and the Arts
- Department of State Development, Infrastructure and Planning
- Department of Transport and Main Roads
- Enterprise Whitsundays
- Mackay Conservation Group
- QR National (now known as Aurizon)

- Queensland Health
- Queensland Police Service
- Queensland Treasury
- Road Accident Action Group
- Skills Queensland
- Sunwater
- Whitsunday Regional Council

An advisory body briefing for the project was held in Brisbane on Monday 28 May 2012 during the EIS public submission period.

On 3 April 2012 the names of several of the Queensland government departments that were members of the advisory body for the project changed (see Public Service Departmental Arrangements Notices (No.1 & No. 2) 2012). Consistent liaison with relevant advisory bodies was maintained throughout the changes. Table 5 summarises the changes that occurred to Queensland Government departments referred to in this report.

Table 5 - Changes to Queensland government departments

Previous department/s	New department/s (as of 3 April 2012)
Department of Employment, Economic Development and Innovation	Department of State Development, Infrastructure and Planning Queensland Treasury and Trade Department of Agriculture, Fisheries and Forestry
Department of Environment and Resource Management	Department of Environment and Heritage Protection Department of Natural Resources and Mines Department of Energy and Water Supply Department of Science, Information Technology, Innovation and the Arts Department of National Parks, Recreation, Sport and Racing
Department of Local Government and Planning	Department of Local Government
Department of Communities Department of Education and Training	Department of Education, Training and Employment Department of Communities, Child Safety and Disability Services Department of Housing and Public Works Department of Aboriginal and Torres Strait Islander and Multicultural Affairs

3.3.3 Public notification

In accordance with the statutory requirements, public notices were placed in The Australian, The Courier-Mail, Mackay Daily Mercury and Central Queensland News to notify the availability of the draft TOR and EIS for review and public comment. In addition, notices advising the availability of the draft TOR and the EIS for public comment were displayed on the EHP website.

The draft TOR and EIS were placed on public display at the following locations during their respective public comment and submission periods:

- EHP website (draft TOR only)
- EHP office, 400 George Street, Brisbane
- EHP office, Hospital Road, Emerald (draft TOR only)
- EHP office, Wood Street, Mackay (EIS only)
- Whitsunday Regional Council Library

- QCoal Pty Ltd website
- QCoal Pty Ltd office, Creek Street, Brisbane

3.4 Matters considered in the EIS assessment report

Section 58 of the EP Act requires, when preparing this EIS assessment report, the consideration of the following matters:

- the final TOR for the EIS;
- the submitted EIS;
- all properly made submissions and any other submissions accepted by the chief executive;
- the standard criteria;
- another matter prescribed under a regulation.

These matters are addressed in the following subsections.

3.4.1 The final TOR

The final TOR document, issued on 17 December 2010, was considered when preparing this EIS assessment report. While the TOR were written to include all the major issues associated with the project that were required to be addressed in the EIS, they were not exhaustive, nor were they to be interpreted as excluding all other matters from consideration.

Where matters outside of those listed in the final TOR were addressed in the EIS, those matters have been considered when preparing this EIS assessment report.

3.4.2 The submitted EIS

The “submitted EIS” was considered when preparing this EIS assessment report. The “submitted EIS” comprised the following documents:

- the EIS that was made available for public submissions from 14 May to 25 June 2012
- the response to submissions and amendments to the EIS received by EHP on 14 February 2013
- the responses to EHP's section 62 (EP Act) information request received on 5 and 8 July 2013, containing additional information about final landform design and rehabilitation, cumulative ecological impacts and state and federal offsets, including a revised biodiversity offset strategy
- a revised EM Plan dated July 2013 and received by EHP on 31 July 2013.

3.4.3 Properly made submissions

EHP received 22 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:

- Two members of the public
- Commonwealth Department of Sustainability, Environment, Water, Population and Communities
- Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
- Department of Agriculture, Fisheries and Forestry
- Department of Communities, Child Safety and Disability Services
- Department of Community Safety
- Department of Education, Training and Employment
- Department of Housing and Public Works
- Department of Local Government
- Department of Sciences, Information Technology, Innovation and the Arts
- Department of State Development, Infrastructure and Planning

- Department of Transport and Main Roads
- Emanate Legal on behalf of a member of the public
- LJ Hooker (Bowen)
- Mackay Conservation Group
- QR National
- Queensland Health
- Queensland Police Service
- Queensland Treasury
- Skills Queensland
- Whitsunday Regional Council

EHP provided its own submission on the EIS to the proponent, plus one submission from DNRM during the transitional arrangements associated with the machinery of government changes.

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

3.4.4 The standard criteria

Section 58 of the EP Act requires that, among other matters, the standard criteria listed in Schedule 3 of the EP Act must be considered when preparing the EIS assessment report. The standard criteria are:

- a) the principles of ecologically sustainable development as set out in the National Strategy for Ecologically Sustainable Development; and
- b) any applicable environmental protection policy; and
- c) any applicable Commonwealth, State or local government plans, standards, agreements or requirements; and
- d) any applicable environmental impact study, assessment or report; and
- e) the character, resilience and values of the receiving environment; and
- f) all submissions made by the applicant and submitters; and
- g) the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows—
 - an environmental authority;
 - a transitional environmental program;
 - an environmental protection order;
 - a disposal permit;
 - a development approval; and
 - the financial implications of the requirements under an instrument, or proposed instrument, mentioned in paragraph (g) as they would relate to the type of activity or industry carried out, or proposed to be carried out, under the instrument; and
 - the public interest; and
 - any applicable site management plan; and
 - any relevant integrated environmental management system or proposed integrated environmental management system; and
 - any other matter prescribed under a regulation.

EHP has considered the standard criteria when assessing the project.

3.4.5 Prescribed matters for EIS assessment report

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 section 2 of this report. The matters of NES likely to be affected by the project are outlined in section 4.15 of this report. A summary of the projects relevant impacts and feasible mitigation measures or changes to the project are discussed throughout section 4 of this report. A summary of feasible alternatives and the likely impact of the alternatives on MNES are discussed in section 4.16.4 of this report. Conditions of approval for the project to address impacts on MNES would be developed by the Commonwealth after the completion of the EIS process (see section 3.4.6).

3.4.6 Environmental Protection and Biodiversity Conservation Act 1999

The Drake Coal Project was referred by the proponent on 21 April 2010 to the then Department of the Environment, Water, Heritage and the Arts (now Department of Environment, Water, Population and Communities (SEWPAC)) under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 4 June 2010, SEWPAC determined the project to be a controlled action requiring approval under the EPBC Act. The relevant controlling provisions are listed threatened species and communities (sections 18 & 18A).

Consequently, the EIS process for the Drake Coal Project 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 Bilateral Agreement). Section 4.18 of this EIS assessment report includes an assessment of MNES and 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.

4 Adequacy of the EIS in addressing the TOR

Table 6 lists the main aspects of the project addressed in the EIS and highlights the significant issues associated with those aspects. The table notes whether the submitted EIS adequately addressed the matters described in the TOR. The subsections of this chapter summarise the key project issues addressed in the EIS, discuss the findings of the EIS in regard to them, including any issues not adequately addressed and outline the environmental protection commitments made by the proponent. The recommendations about matters requiring action contained in the subsections of this chapter should be fully implemented by the proponent.

Table 6 - Summary of the EIS in addressing the TOR

Matters included in the TOR	Significant issues	Adequacy of the EIS in addressing significant issues
Introduction	Overview of the project, its objectives and scope Outline of the necessary approvals and their assessment processes	Adequate
Project need and alternatives	Project justification and any alternatives	Adequate
Project description	Location of the project in the regional and local contexts Description of the construction, operation and decommissioning phases of the project	Adequate
Climate	Climatic conditions at the site	Adequate
Land	Topography/geomorphology Resource utilisation Land use Soil types and land suitabilities Good quality agricultural land Strategic cropping land Land contamination Land disturbance Rehabilitation and decommissioning Landscape character and visual amenity (including lighting)	Adequate Proponent commits to preparing: • A sediment and erosion control plan to manage sodic/dispersive soils • A final land use and rehabilitation plan • A mine closure plan
Transport	Transportation of personnel and infrastructure by road during construction and operation Transportation of coal by rail Export of coal from Abbot Point	Adequate Matters requiring action: • Bowen Developmental Road/mine access road intersection lighting • safety on the Bowen Developmental Road • safety at rail level crossings • final road impact assessment • final road-use management plan • final traffic management plan. Proponent commits to: • pay a maintenance contribution to

Matters included in the TOR	Significant issues	Adequacy of the EIS in addressing significant issues
		DTMR for state-controlled road use prepare a traffic management plan
Waste	Excavated waste rock and coarse rejects and fine coal tailings handling and disposal Waste rock and fine coal tailings characterisation and management Sewage waste treatment and management Other solid and liquid waste management and disposal	Adequate The proponent commits to: preparing a waste management strategy for the life of the project
Water resources	Surface water and groundwater management Diversion of Twelve Mile Gully	Adequate Matters requiring attention: - identification of surface water-groundwater interactions - identification of water supply bores within the vicinity of the project The proponent commits to: - expanding the existing groundwater monitoring program to determine surface water-groundwater interaction - updating the Water Management Strategy - conducting a landholder bore survey to determine water supply bores in the vicinity of the project - make good arrangements with landholders if groundwater supply bores are impacted by the project
Air quality	Dust impacts on sensitive receptors Dust emissions during rail transport of coal Greenhouse gas emissions	Adequate The proponent commits to: - developing mitigation measures to manage coal dust emissions during rail transport - meeting EPP (Air) air quality objectives and goals at all sensitive receptors
Noise and vibration	Day-time and night-time noise at sensitive receptors Low frequency noise Ground vibration and air-blast overpressure impacts due to blasting	Adequate
Ecology	Impacts on terrestrial plants and animals Impacts on regional ecosystems Impacts on aquatic ecology Impacts on watercourse values	Adequate Matters requiring attention: - stygo fauna sampling in the Bowen River alluvium - receiving environment monitoring

Matters included in the TOR	Significant issues	Adequacy of the EIS in addressing significant issues
	Impacts on connectivity values Impacts on stygofauna	program (REMP) - clearing permits and/or species management plans under the <i>Nature Conservation Act 1992</i> for clearing any listed threatened flora species The proponent commits to: - repeating stygofauna sampling in new groundwater monitoring bores associated with the Bowen River alluvium - developing an REMP - liaising with EHP about any requirements for clearing permits and/or species management plans - offsetting residual biodiversity impacts (see below)
Biodiversity offsets (Queensland)	Quantification of ecological impacts Proposed management and mitigation measures Quantification of residual ecological impacts Proposed offset areas	Adequate Matters requiring attention: - ecological equivalence assessment to confirm whether the proposed offset areas are adequate - a signed biodiversity offset strategy - offsets area management plan The proponent commits to: - conducting an ecological equivalence assessment - securing the offset areas - signing a deed of agreement with EHP for the offset areas - developing an offsets area management plan - submitting the final offset package to EHP for approval
Cultural heritage	Indigenous cultural heritage Indigenous cultural heritage management plan Non-Indigenous cultural heritage	Adequate
Social	Impacts on local community, housing and services Impacts due to construction and operation workforces	Adequate The proponent commits to: - finalising a Social Impact Management Plan - finalising an Integrated Housing Strategy
Health and safety	Air and noise emissions Disease vectors Traffic and road safety	Adequate

Matters included in the TOR	Significant issues	Adequacy of the EIS in addressing significant issues
Economy	Alienation of grazing land Effects on the local, regional and state economy	Adequate The proponent commits to: • preparing a local industry participation plan • finalising the Social Impact Management Plan
Hazard and risk	Unplanned discharges to air, water or land Transportation, storage and use of hazardous substances Emergency response	Adequate Matters requiring attention: • developing an emergency access action plan The proponent commits to: • preparing a Risk Management Plan
Matters of national environmental significance	Quantification of impacts on threatened ecological communities and listed species Quantification of impacts on migratory species Proposed management and mitigation measures Quantification of residual impacts Biodiversity offset requirements	Adequate Matters requiring attention: • offsets area management plan • an amended Biodiversity Offset Strategy The proponent commits to: • preparing an offsets area management plan • revising the Biodiversity Offset Strategy

4.1 Introduction

The EIS provided an adequate introduction to the project, its objectives and scope. It adequately discussed the legislation applicable to the project and identified the necessary approvals and outlined the assessment and approval processes.

4.2 Project need and alternatives

Project need and alternatives are discussed in section 4.18.4 of this report.

4.3 Project description

The EIS adequately described the location, scope and phases of the project. No submissions on the EIS requested additional information. An outline of the project has been provided in section 2 of this report.

4.4 Climate

Chapter four of the EIS described the local and regional climatic conditions in the vicinity of the project area. Climate information was used in subsequent sections of the EIS (particularly air and noise) to assist in making predictions about impacts of the project.

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

The climate of the area is tropical with high variability in rainfall, temperature and evaporation. The Collinsville region can experience drought, floods, heatwaves and frosts. In general, winter days are warm and nights are cool, while summer days are hot and nights are warm. 487mm of the 716mm mean annual rainfall occurs in the wet

season months between December and March from thunderstorms and tropical lows associated with cyclones. Average mean monthly rainfall ranges from 137mm in January to just 11mm in September. Average mean monthly evaporation rates range from 194mm in January down to 94mm in June and are substantially higher than corresponding mean monthly rainfall rates. The mean seasonal maximum temperatures for the Collinsville region range from 31.7°C in Spring, 33.4°C in Summer, 29.9°C in Autumn and 25.7°C in Winter. The winds are predominantly from the north-east to the south-southeast.

4.5 Land

Chapter five of the EIS described the land resources associated with the project site. A detailed soils and land suitability assessment was included in Volume 2B - Appendix C of the EIS and a site contamination assessment was included in Volume 2B - Appendix D.

The EIS adequately described those aspects of the project site related to the existing and proposed qualities and characteristics of the land. The following subsections address those qualities and characteristics in more detail.

4.5.1 Topography/geomorphology

The EIS adequately described the topography and geomorphology of the project site. The project site is characterised by flat to slightly undulating plains across its southern extent, with small hills in the north-east and north-west. The project site varies in elevation from 130m and 200m Australian Height Datum (AHD). The slope is $\leq 3\%$ across much of the project site with steeper slopes ranging from 3% to 10% associated with hills in the north-east. Steep gullies, ridgelines and watercourses occur throughout the site. The project site is located in the Bowen River sub-catchment of the Burdekin River catchment. The Bowen River sub-catchment covers about 1137 square kilometres (km²). The Burdekin River catchment covers about 130,000km².

The main impacts on existing topography would include:

- open-cut mining
- constructing waste rock emplacements
- constructing the CHPP and ROM coal handling facilities
- constructing water storages and water management infrastructure, including dams
- product coal stockpiles and coal handling areas
- constructing train loading infrastructure, the rail spur and rail loop
- constructing haul roads and mine access roads.

Proposed mitigation measures include:

- progressive backfilling behind the advancing open-cut pits to integrate project landforms with the existing topography
- progressive rehabilitation of mining areas, including respreading topsoil and capping erosion prone spoil
- decommissioning and removing project infrastructure at the end of mine life, including CHPP and ROM coal handling areas, train loading infrastructure, water management infrastructure and haul roads.

The significance of impacts on topography and geomorphology and the adequacy of proposed mitigation measures are discussed in section 4.4.9 of this report.

4.5.2 Resource utilisation

The EIS adequately described how the project would recover the targeted coal resource. A summary of how the project intends to maximise the extraction of the coal resource is outlined below.

The Drake Coal Project covers a complete sequence of the Moranbah Coal Measures which reach a maximum thickness of around 480m and comprise cross-bedded lithic sandstone and siltstone, mudstone and coal seams. The Moranbah Coal Measures contain seven economically viable coal seams designated as A (deepest seam), B, C, E, P, P Rider and Q. Coal seams A through Q inclusive would be mined at the Drake Coal Project at various locations. The coal seams subcrop in a north to north-east direction and dip at low angles to the east and south-east. Interburden rocks consist of quartz-poor lithic sandstones, siltstones, shale and mudstones that sub-crop in a north to north-east direction and dip at low angles to the east and south-east. Exploration activities have identified a defined resource in excess of 200Mt of economically recoverable coal that would be extracted at a maximum rate of 10Mt/y of ROM coal and processed to produce up to 156 million tonnes (Mt) (i.e. 6Mt/y) of coking and thermal

product coal over a mine life of 26 years. The annual coal extraction rate would vary from year to year due to initial ramp up and also due to ramp down during years with excessive wet weather or higher overburden strip ratios.

DNRM has considered the resource recovery proposal and has determined that it suitably extracts the state's resources without unnecessarily sterilising any resources that could potentially be mined in the future.

4.5.3 Land use

The EIS adequately addressed the requirements of the TOR for land use. A summary of land uses within and surrounding the project is provided below.

The project area is currently used for beef cattle grazing using the cell grazing technique. There are currently two residential dwellings, a cattle yard, sheds, fences, watering points and access tracks across the property. The Newlands-Abbot Point railway line and Bowen Development Road corridor bound the project area to the east. The Collinsville and Sonoma mines are located to the north and the proposed Jax and Sarum mines are located to the east and south-east respectively. The Collinsville township is located about 5.5km north of the northern project boundary. A number of residential dwellings are located along Pelican Creek about 2.5km north of the northern project boundary.

No areas used for conservation or tourism would be disturbed by the mining activities.

Most disturbed land will be rehabilitated to support grazing, with minor areas of native habitat. However, approximately 458ha of land, including residual voids and waste rock emplacement areas, would be permanently alienated from productive grazing. The economic consequence of alienating this land is discussed in section 4.15 of this report. A detailed discussion of rehabilitation is provided in sections 2 and 4.4.8 of this report.

4.5.4 Soil types and land suitabilities

The EIS generally addressed the requirements of the TOR for soil types and land suitabilities associated with the project. The major impacts of the project on soils and land suitabilities and proposed mitigation measures are summarised below.

The EIS estimated that at least 70% of the site has soils and/or subsoils that have sodic and/or dispersive properties and are prone to erosion. Management of these soils, in regard to erosion control and rehabilitation would present a challenge for the development of the mine. A detailed sediment and erosion control plan would be developed for the mine area and would build on the erosion and sediment control strategies outlined in the EIS. A mine closure plan would also be developed which would include information about topsoil and subsoil stripping and progressive rehabilitation and would build on the rehabilitation commitments outlined in the EIS. Table 7 provides a summary of the land units, the major physical and chemical properties of the soils and their potential use for rehabilitation.

Table 7 – A description of land units on-site and their use for rehabilitation

Land Unit	Proportion (and Location)	Soil salinity	Soil stability	Fertility	Management for rehabilitation
1. Vertisols on low lying areas	28% of the site (West Pits 1 and 2 and waste rock dumps, Central Pits 2 to 4, north-south haul road)	Medium to very high salinity in B horizon, Upper B21 horizon has low salinity and is non-sodic	Sodic and dispersive after disturbance when wet, becoming extremely prone to erosion	limited crop or improved pasture growth, supports germination of native grasses and trees	A1 and B21 horizons suitable for rehabilitation
2. Vertisols on undulating terrain	9% of the site (West Pit 2)	Low salinity in upper horizons, medium to high salinity after B22 horizon	Soils may disperse after disturbance when wet, susceptible to sheet erosion	Limited crop or improved pasture growth, supports germination and growth of native grasses and trees	A1, B21 and B22 horizons suitable for rehabilitation
3. Sodosols on undulating low hills	17% of the site (West Pits 1 and 2 and waste rock emplacements)	High salinity in B horizon	Low soil stability, strongly sodic and dispersive, highly erodible if disturbed or vegetation removed, highly	Limited crop or improved pasture growth, does not support germination of native grasses or trees when subsoils exposed	Not recommended to be stripped for rehabilitation

Land Unit	Proportion (and Location)	Soil salinity	Soil stability	Fertility	Management for rehabilitation
			prone to erosion		
4. Sodosols on floodplain with minor Rudosols	16% of the site (West Pit 1 and waste rock dumps, co-disposal storage dam, Central Pit 3)	Salinity is generally low, but highly variable between soil profiles	Low soil stability, Sodosol subsoils are highly prone to erosion, sodic at depth	Limited for crop or improved pastures, suitable for native plants if subsoils aren't exposed	Not recommended to be stripped for rehabilitation
5. Dermosols and Vertosols on undulating terrain	25% of the site (Central Pit 1, East Pits 1 and 2, MIA, part of West Pit 1, East Pits 3 and 4 and waste rock dumps)	Low salinity in A horizon, medium to high salinity in B horizon	Mainly non-sodic soils with low erodibility, low erosion	Limited for crop or improved pastures due to salinity and sodicity, suitable for native species growth	A1 horizon is suitable for rehabilitation, B1 horizon would be used if no other options are available
6. Tenosols and Rudosols adjacent to intermittent or permanent watercourses	5% of the site (Twelve Mile Gully diversion, West Pit 1, Central Pit 2 and waste rock dumps, north-south haul road)	Very low salinity	Non-sodic	Present in thin bands making it difficult to remove separately for topsoil	Not recommended to be stripped for rehabilitation unless intermixed with surrounding soils

The rehabilitation goals include a rehabilitated final land use in unconstrained areas of low intensity beef cattle grazing (land suitability class four or better) and a rehabilitated final land use in constrained areas (e.g. final voids, waste rock emplacements) of land suitability class five.

Soil and subsoils considered suitable for stripping and subsequent use for rehabilitation were identified in Land Units 1, 2 and 5. If no alternative exists, the subsoils from Land Units 1, 2 and 5 would be enriched and used as topsoil for rehabilitation. The topsoil stripping and rehabilitation options outlined in the EIS would result in either suitable topsoil re-spread at 0.25m in depth over 75% of rehabilitated areas, or a topsoil depth of 0.25m over 2150ha and a topsoil and subsoil depth of 0.15m each re-spread over 1300ha of rehabilitated areas.

DNRM and Whitsunday Regional Council commented on the EIS that the soil stripping and reuse proposal outlined in the EIS was insufficient to achieve the desired rehabilitation outcome of restoring the land to its pre-mining land use of cattle grazing. DNRM requested the proponent to consider stripping and stockpiling the A1 and A2 horizons of the Sodosols in Land Units 3 and 4 and separately stripping the bands of Tenosols and Rudosols in Land Unit 6 to increase the depth of topsoil and subsoil to 0.5m over all rehabilitated areas.

The proponent responded in the Supplementary EIS and agreed that the lighter textured topsoil from Land Units 3 and 4 can be used for rehabilitation purposes and committed to including these in the mine closure plan. The proponent did not commit to stripping the bands of Tenosols and Rudosols in Land Unit 6.

Recommendation

The proponent should develop a mine closure plan that includes stripping the A1 and A2 horizons of the Sodosols in Land Units 3 and 4 and the bands of Tenosols and Rudosols in Land Unit 6.

The land suitability ratings for grazing and agricultural purposes of the six major land units on the project site are outlined in Table 8.

Table 8 - Land suitability ratings at the project site

Land unit	Rainfed broadacre cropping	Beef cattle grazing	Irrigation within 5km of Bowen River
1. Vertisols on low lying areas	Class 4 - marginal land considered unsuitable due to severe limitations	Class 3 - suitable land with moderate limitations	Restricted to trickle irrigation due to soil chemistry
2. Vertisols on undulating	Class 3 - suitable land with	Class 3 - suitable land with	Suitable, but located more

Land unit	Rainfed broadacre cropping	Beef cattle grazing	Irrigation within 5km of Bowen River
terrain	moderate limitations	moderate limitations	than 5km from Bowen River
3. Sodosols on undulating low hills	Class 5 - unsuitable land with extreme limitations	Class 4 - marginal land considered unsuitable due to severe limitations	Unsuitable due to soil chemistry and topography
4. Sodosols on floodplain with minor Rudosols	Class 4 - unsuitable land with extreme limitations	Class 3 - suitable with moderate limitations	Unsuitable due to soil chemistry and erosion
5. Dermosols and Vertosols on undulating terrain	Class 4 - marginal land considered unsuitable due to severe limitations	Class 3 - suitable with moderate limitations	Restricted to trickle irrigation due to soil chemistry
6. Tenosols and Rudosols adjacent to intermittent or permanent watercourses	Class 4 - marginal land with severe limitations	Class 3 - suitable with moderate limitations	Unsuitable due to topography

The land suitability assessment indicates that all land units on-site have a higher suitability for beef cattle grazing than for rainfed broadacre cropping, except for land unit two which was rated as fair for both land uses. With the exception of land unit three, approximately 85% of the site is considered suitable for beef cattle grazing. The soils were considered unsuitable for irrigation due to the shrink-swell properties of the Vertosols or the sodic subsoil and high erodibility potential of the Sodosols.

Mining activities have the potential to alter land suitability due to changes in the physical, chemical and biological properties of soil, changes in slope and slope length and changes in soil depth and the quality of the underlying spoil. However, a return to previous low intensity beef cattle grazing land use is considered achievable for those areas not subject to significant landscape modification. In areas of significant landscape modification (e.g. final voids and waste rock emplacements), agricultural suitability class would decrease and these areas would not be suitable for cattle grazing. Waste rock emplacements would be rehabilitated to native bushland. Final voids would be reshaped into a stable landform.

4.5.5 Good quality agricultural land

The EIS adequately addressed the requirements of the TOR for good quality agricultural land. A summary of the assessment is provided below.

The project area is located within a good quality agricultural land (GQAL) special management area, with protection of the GQAL as the desired environmental outcome under the Bowen Shire planning scheme. GQAL is defined as class A land and in some cases may include class B and better quality class C land where pastoral industries dominate. According to the soils field investigation (see section 4.5.4) Land Unit 2 (Vertisols on undulating terrain) is considered to be class A agricultural land suitable for potential crops with moderate limitations. Land Units 1, 3, 4, 5 and 6 are considered to be class C agricultural land, suitable only for improved or native pastures due to limitations which preclude continuous cultivation for crop production. However, some areas may tolerate a short period of ground disturbance for pasture establishment.

The proponent's results generally correlate with the planning scheme, except the planning scheme indicates more extensive class A land in areas that correspond with land unit one. While these lands are considered suitable for agricultural uses, the field investigation conducted by the proponent identified some inherent limitations to the implementation of agriculture in these areas. The better quality land suitability class 3 soils for broadacre cropping and beef cattle grazing only occur in small, unconnected areas on undulating terrain. Consequently, the viability of cropping these fragmented areas is considered to be marginal and the economic returns from the limited agricultural enterprises available may not be viable.

The Whitsunday Regional Council commented on the EIS that the field investigation conducted by the proponent did not support the agricultural land class conclusions and recommended that the agricultural land classes be revised. The proponent responded by providing some further clarification for determining the land classes. Whitsunday Regional Council reviewed the new information and accepted the proponent's conclusions.

4.5.6 Strategic cropping land

The EIS adequately addressed the requirements of the TOR for strategic cropping land. A summary of the strategic cropping land assessment is summarised below.

The EIS identified that the project site contains areas of potential strategic cropping land (SCL) identified on the SCL trigger maps that would be impacted by mining activities. The *Strategic Cropping Land Act 2011* (SCL Act) and associated State Planning Policy were enacted after the EIS for the project was submitted for assessment and a validation assessment was undertaken concurrently to the EIS process to determine whether or not the land meets the strategic cropping land criteria requirements. On 4 July 2013 a cropping history test decision was made under the SCL Act, which determined that the project site does not contain strategic cropping land. Consequently, no strategic cropping land approvals would be required for the project.

4.5.7 Land contamination

The EIS adequately addressed the requirements of the TOR for land contamination on the project site. The potential sources of land contamination and proposed mitigation measures are summarised below.

A Stage 1 Site Contamination Assessment undertaken at the project site found the following potential areas of environmental concern:

- one aboveground 8000 litre (L) diesel storage tank
- one aboveground 2000L petrol storage tank
- one underground 2000L petrol storage tank
- cattle yards and cattle dip
- former aboveground arsenic storage area.

These areas are in the vicinity of the mining pits on Mining Lease 10349, and the proponent plans to demolish all existing structures on-site. Demolition works will be guided by a remediation plan. If any contaminated soil is identified during the demolition works and it is determined that the contaminated soil should be removed from the site, approval would be required under section 424 of the EP Act.

4.5.8 Land disturbance

The EIS adequately addressed the requirements of the TOR for land disturbance associated with the project. The land disturbance impacts of the project and proposed mitigation measures are summarised below.

The mining activity would result in both temporary and permanent changes to the landscape, and the major potential impacts include:

- changes to the physical, chemical and biological properties of soil due to vegetation clearing and topsoil stripping and stockpiling
- changes in slope and slope length and changes in soil depth and the quality of underlying spoil as a result of open-cut coal extraction
- changes to final land use due to altered landforms including pits and spoil dumps
- increased erosion and sedimentation potential.

The mitigation measures proposed to manage these impacts include:

- progressive backfilling behind the advancing pit to integrate mined landforms with the existing topography and to minimise the footprint of out-of-pit waste rock emplacements
- progressive rehabilitation of affected landforms that maximises integration with the surrounding landscape
- application of seed and fertiliser mixes to soils to promote rapid vegetation establishment
- ripping topsoil stockpiles and seeding with pasture grasses to limit erosion, minimise changes to the physical and chemical soil properties and maintain a viable seed bank if soil is to be stockpiled for more than six months prior to use for rehabilitation
- monitoring the final landform to determine whether slumping or erosion is occurring and implementing remediation measures, as required
- retaining site water management dams as stock water storages to support the re-establishment of grazing after mining ceases, subject to landholder agreement.

The proposed rehabilitation strategy for land disturbed by the project is discussed below.

4.5.9 Rehabilitation and decommissioning

The EIS adequately addressed the requirements of the TOR for site rehabilitation. The rehabilitation strategy proposed for the project is discussed below.

Rehabilitation would be conducted in all areas of disturbance with the goal to develop final landforms across the majority of the site that support low intensity beef cattle grazing. When areas become available for rehabilitation, appropriate pasture grasses would be planted. Criteria for achieving self-sustaining final landforms would be developed as part of the mine closure plan based on site-specific rehabilitation trials, monitoring and research programs.

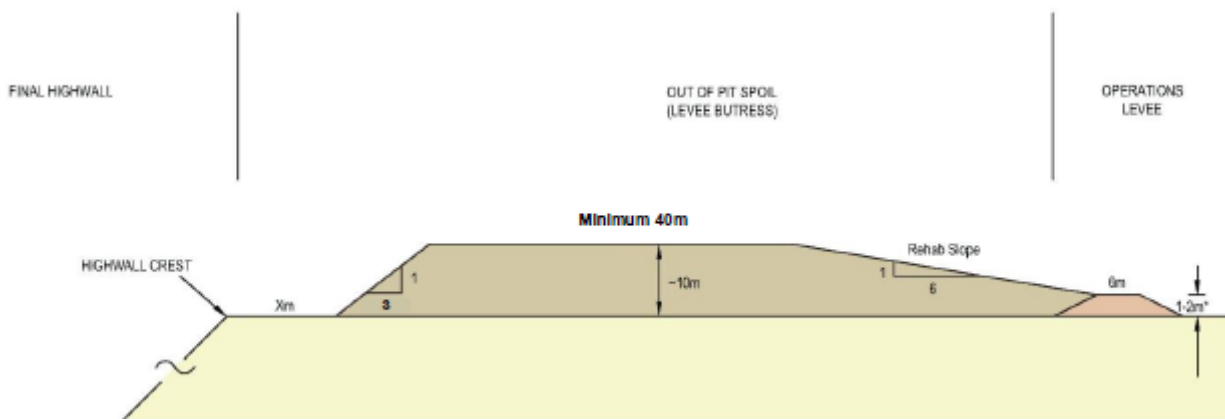
The final rehabilitated landform would consist of regraded final pit voids partially backfilled to cover and seal off the coal seam faces and a topsoiled, revegetated and contoured terrace plateau. Contour batters/drains would collect rainfall and feed it to sediment control dams. The main components of the progressive rehabilitation would include:

- stockpiling topsoil and progressively placing it on rehabilitation areas
- constructing a final, stable landform consisting of out-of-pit and in-pit waste rock emplacements and rehabilitated final voids
- internal placement and capping of sodic and acidic material within waste rock emplacements
- regrading final landform designs with a maximum slope grade of 1:6
- contour ripping after topsoil placement to minimise erosion
- seeding disturbed areas with an appropriate seed mix prior to the wet season to maximise growth benefits from subsequent rainfall
- applying fertilisers to topsoil and subsoil to maximise plant establishment, if required
- respreading cleared vegetation on rehabilitated areas to promote fauna biodiversity and re-establishment
- managing direct rainfall and run-off from rehabilitated landforms in sediment dams and final voids
- conducting rehabilitation trials to determine appropriate capping, species selection and rehabilitation methodologies
- decommissioning and removing the majority of infrastructure, including the CHPP, MIA, rail infrastructure and overhead electricity facilities. Some water storages may remain if agreed in writing with the freehold landowner.

EHP, the Mackay Conservation Group and one public submission commented on the EIS that the 1-in-1000-year levees proposed to protect West Pit 1 and East Pit 4 during operations would be insufficient to protect these voids from overtopping in the longer term after mining had been completed. EHP requested the proponent to revise the mine closure plan. The proponent provided further information in the SEIS and in additional correspondence received on 8 July 2013. As identified in section 2 of this report, the proponent has committed to completely backfilling the East Pit 4 void, removing the need for a levee after mining has been completed. The proponent also committed to reducing the final footprint of the West Pit 1 final void and ensuring that the void would be protected from floodwaters above the probable maximum flood (PMF) level. The commitments for the rehabilitation of West Pit 1 include:

- completely backfilling the northern void
- reducing the volume of the southern void
- construct a 10m high spoil buttress behind the operational levee to provide flood protection for the void above the PMF level (see Figure 2).

Figure 2 - Cross-section of levee buttress proposal around West Pit 1 final void (Source: Drake Coal Project - EM Plan)



EHP considered the proposal and determined that it provided adequate flood protection for the West Pit 1 final void. A condition about the decommissioning of final voids with flood protection above the PMF level would be included in the project EA (Appendix 2).

4.5.10 Landscape character and visual amenity

The EIS adequately addressed the requirements of the TOR for landscape character and visual amenity. The impacts of the project on landscape character and visual amenity and proposed mitigation measures are summarised below.

The landscape surrounding the project is a relatively gently undulating landform. However, the landscape to the east of the project site is relatively hilly with Mount Vista and Sonoma Peak providing a hilly landform. Native vegetation has been substantially modified or cleared to accommodate current and historic grazing practices. Small remnant pockets of native vegetation are intermittently scattered throughout the landscape. The visual catchment of the project extends over Two Mile Creek to the north and incorporates the residential dwellings along Pelican Creek located 3km to the north, Sonoma Homestead located 2.8km to the north, ridges over the eastern side of the project, Belmore Homestead located 3.5km to the east, and Havilah Homestead located 4.2km to the south of the project area. The Bowen Development Road borders the eastern boundary of the project area and runs in a north-south direction. The Bowen River borders the southern boundary of the project area and flows in an east to west direction.

The Drake Coal Project would affect the visual landscape both during and after mining by progressively constructing and leaving behind a series of final voids, waste rock emplacements and a rehabilitated aboveground co-disposal dam. Other site infrastructure including the MIA, ROM pad and product coal stockpiles, CHPP, administration buildings, train loading and rail loop infrastructure could affect the visual landscape during mining, but would be decommissioned and removed from the site after mining has finished.

The Bowen River is used for recreational pursuits by local residents. However, the deeply incised valley associated with the river means that the project would not be visible from river level.

The Sonoma Coal Mine is an existing dominant landscape feature located to the south-east of the Sonoma Homestead and the residential dwellings along Pelican Creek. The banks of Pelican Creek are vegetated by a mix of grassland and open eucalypt forest, providing a sparse visual buffer between the dwellings and the project site to the south. Also, the residential dwellings are located at a lower elevation than the project site further reducing the visual impact of the project. The Drake Coal Project would create a similar, additional landscape feature to the south of the Sonoma Homestead.

The Belmore Homestead is separated from the project site by a 10m high ridge that would provide a partial visual buffer to the mining activities.

The measures proposed to mitigate the impacts of the project on landscape character and visual amenity would involve:

- visual buffers between dwellings and mining infrastructure during mining
- rehabilitating disturbed areas and removing all project related infrastructure after mining has been completed.

No major landscape character and visual amenity issues were raised during the EIS assessment process.

4.5.10.1 Lighting

The EIS adequately addressed the requirements of the TOR for lighting. No major issues associated with project lighting were raised during the EIS assessment process. The lighting impacts of the project and proposed mitigation measures are summarised below.

Night-time operations would require lighting, which would create a glow in the night sky similar to other mines in the region, such as Sonoma and Collinsville coal mines. The night-time lighting may be visible from a number of residences north of the project site and from elevated sections of the Bowen Developmental Road.

The following mitigation measures would be implemented to reduce potential lighting impacts:

- the use of directional lighting in operational areas such as waste emplacements and open cut pits
- the use of screens to shield excessive light and reduce light spillage to adjacent residences and the Bowen Developmental Road
- perimeter bunding, waste emplacements and tree planting to reduce light spillage, particularly towards the northern project boundary
- haul trucks would operate using low beam headlights
- a complaints register including light complaints would be maintained and appropriately addressed
- topsoil stockpiles would be constructed adjacent to the road to shield light from road users vision
- screening the road from the mine if all other measures are inadequate.

4.6 Transport

Project transport is discussed in Chapter six of the EIS and a transport impact assessment is provided in Volume 2a - Appendix F. The transport assessment was generally satisfactory and adequately addressed the requirements of the TOR. A summary of the transport assessment and recommended conditions of approval is provided below.

4.6.1 Road

The road network infrastructure surrounding the project is well developed servicing several coal mines and agricultural land uses. The project site would be accessed exclusively via the Bowen Developmental Road at a new mine access intersection. The Bowen Developmental Road is an approved heavy vehicle route that is currently in good condition and provides direct site access from both the north and south. The workforce and a large proportion of the heavy vehicles would access the Bowen Developmental Road from the north via Bowen and Collinsville. Most deliveries to the site would be made using Class 9 prime-mover and semi-trailer vehicles. However, some deliveries would be made using Type 1 AB-triple road trains. Larger plant and equipment that cannot be assembled on-site (such as crushing and handling equipment) would be delivered as over-dimensional or excess mass loads. Personnel will travel between Collinsville and the project site using a combination of private vehicles and buses.

A 15 month construction phase would generate light vehicle and bus traffic associated with the 350 person workforce travelling from an accommodation camp in Collinsville and a small percentage of staff travelling from Bowen to and from the site on a daily basis. There would also be a three month overlap of the construction and operation phases with an anticipated combined integrated workforce of around 300 persons. During the construction phase heavy vehicle traffic would deliver structural steel, platework, fuel, concrete, gravel, plant and mining equipment associated with the construction of the CHPP and train loading and rail loop infrastructure. Construction equipment would be sourced locally wherever possible. However, it is expected that some materials and equipment would be sourced from Mackay, Townsville and Brisbane. Additional traffic would be generated by service vehicles.

A 26 year operation phase would generate light vehicle and bus traffic associated with the 280 person average (peaking at 480 persons in year 25) workforce. The workforce would travel from private residences or camp style accommodation in Collinsville to and from the site on a daily basis. Heavy vehicle trips to and from the site would also be required for the delivery of fuel and general store products.

Based on these assumptions the EIS predicts that additional road traffic would be generated by the Drake Coal Project as detailed in Table 9 below.

Table 9 - Expected traffic generation to the project site during construction and operation

Vehicle type	Average one-way trips						Vehicle origin
	Construction		Construction/ operation		Operation		
	Daily	Yearly	Daily	Yearly	Daily	Yearly	
Light vehicle (workforce - 3 persons per vehicle)	33	12000	33	12000	43	15600	75% Collinsville 25% Bowen
Light vehicle (visitors)	2-3	1080	7-8	2880	9-10	3600	50% Proserpine 25% Mackay 25% Townsville
Bus (workforce - 50 persons per vehicle)	5	1825	4	1460	7	2555	75% Collinsville 25% Bowen
Semi-trailer (steel and platework)	<1	174	0	0	0	0	30% Mackay 30% Townsville 40% Brisbane/ SEQ region
Semi-trailer (mining plant, fixed plant)	<1	65	<1	15	0	0	15% Mackay 15% Townsville 70% Brisbane/south region
Tanker (fuel)	<1	40	<1	28	1-2	400	50% Mackay 50% Townsville
Tanker (reagents and consumables)	0	0	<1	2	<1	8	100% Mackay
Mixer (concrete)	2-3	1000	<1	91	0	0	100% Collinsville
AB-triple (gravel)	<1	273	<1	27	0	0	100% Collinsville
Truck (general store)	<1	210	<1	50	<1	210	50% Collinsville 25% Mackay 25% Townsville

The Bowen Developmental Road between Collinsville and the project site is the only road section predicted to experience a significant increase in traffic. The EIS predicted an average annual daily traffic (AADT) increase of 45 (light and heavy) vehicles one-way during the peak of construction, 42 vehicles one-way during the peak of construction and operations overlap and 60 vehicles one-way during the peak of operations. The traffic increase compared to background ranges from seven to 25% during the construction phase, 11 to 28% during the construction and operation overlap phase and between 16 to 40% during the operation phase of the project. The peaks of these traffic increases are predicted to occur in the morning (5am to 6am) and evening (6pm to 7pm) and would not represent a continual increase across the day. While the traffic increases are within the available capacity of the Bowen Developmental Road, the predicted increases of the accumulated workforce, visitors and heavy vehicle traffic are above the 5% AADT threshold. Consequently, a road maintenance contribution would be required to be paid to DTMR. No other roads used by the project were predicted to experience increases in traffic above the 5% AADT threshold.

Recommendation

The proponent should liaise with DTMR about a road maintenance contribution for the project related traffic increases on the Bowen Developmental Road between Collinsville and the project site.

Mine access intersection

The mine site access intersection is proposed to be located on the western side of the Bowen Developmental Road, approximately 17km south of Collinsville. The preferred location was selected based on safety, including optimising approach, intersection, minimum gap and rail crossing sight distance, as well as geometric constraints associated with the rail crossing which runs parallel to the Bowen Developmental Road. An initial assessment of intersection design was presented in the EIS based on the AADT for the Bowen Developmental Road, potential project traffic, reference to current standards and a high degree of safety. The assessment determined that the intersection design should include a channelised right and auxiliary left configuration. A rail level crossing of the Newlands-Abbot Point railway line is included in the design.

DTMR identified that a detailed assessment in accordance with DTMR's Road Planning and Design Manual and the Interim Guide to Road Planning and Design Practice of the standard and configuration of intersection lighting at the Bowen Developmental Road/mine access road intersection had not been completed in the EIS.

The proponent responded in the SEIS that, based on the Manual of Uniform Traffic Control Devices, where channelisation of the intersection is provided, lighting may not be required if retro-reflective signage and pavement markers are installed and deemed adequate for the delineation of the intersection. The proponent also identified that flag lighting may also be provided at the intersection and/or the train crossing locations where there is a regular shunting, or the crossing is frequently blocked at night. The proponent stated that the provision of lighting at the intersection would be further reviewed and assessed during later stages of the development and detailed design phase of the mine access intersection.

Recommendation

The proponent should assess the lighting requirements at the Bowen Developmental Road/mine access road intersection according to the requirements outlined by DTMR in Appendix 1 of this report.

Mitigation measures

The EIS proposed to implement the following measures to minimise the impact of the project on State-controlled roads and infrastructure:

- where possible, construction material and equipment would be sourced locally to minimise trip distances
- where possible, construction equipment would be transported to site via the Bowen Developmental Road in smaller components and assembled on-site to minimise the number of oversized loads
- larger equipment that cannot be assembled on-site (such as crushing and handling equipment) would be transported under appropriate permits and accompanied by safety escorts, where necessary
- a monetary contribution would be given to the DTMR for the maintenance and rehabilitation of State-controlled roads
- a shuttle bus service to transport construction workers between accommodation facilities at Collinsville (and Bowen, if required) and the project site would be provided to reduce the number of project related private vehicles travelling on roads
- trucks used to transport diesel to site would comply with the Australian Code for Transport of Dangerous Goods by Road and Rail
- fuel trucks would be equipped with first aid, spill response and fire fighting equipment
- a spillage action plan and procedures would be in place for all truck movements
- traffic management plans for oversized loads would be developed and implemented

The road impact assessment (RIA) indicates that in order to minimise the potential number of construction and operational worker movements to and from Collinsville, construction and operational workers would be driven by bus from Collinsville to the mine site. In addition, no private vehicle parking would be permitted on the mining tenement. However it is assumed there would be private vehicle parking allowed for at the accommodation centre in Collinsville. DTMR identified that while the analysis provided in the EIS takes into consideration impacts from construction and operational staff from the accommodation centre to the mine, there is no assessment of the impact north and south of the accommodation centre as workers arrive and depart. Indications are that there would be an increase of up to 40% in daily traffic volumes.

Recommendation

The proponent should assess the impact of the additional traffic on the safety and efficiency of the Bowen Developmental Road north and south of the accommodation centre.

Further, DTMR advised that once additional traffic information is available on the final design and construction of the project including traffic generation, the proponent is required to update the road impact assessment (RIA), road-use management plan (RMP) and any traffic management plan (TMP) to clearly identify any necessary improvement works, rehabilitation and maintenance and road use management strategies to mitigate the impacts of project traffic.

Recommendation

The proponent should finalise the RIA, RMP and TMP in consultation with DTMR Mackay/Whitsunday Regional Office, prior to the commencement of project operations, including construction works.

Further, DTMR advised that certain requirements would need to be met to ensure that the ongoing safety, efficiency and existing condition of the State-controlled road network (SCR) are maintained in accordance with the objectives and provisions of the *Transport Infrastructure Act 1994* (TIA), the *Transport Operations (Road-use Management) Act 1995*, other relevant legislation and DTMR policies and guidelines e.g. Guidelines for Assessment of Road impacts of Development (2006) (GARID). These requirements are listed in Appendix 1.

4.6.2 Rail

A rail loop connecting the project site to the existing Newlands – Abbott Point rail line would be used to transport product coal via the Northern Missing Link (NML) rail upgrade to Abbot Point X50 coal terminal for export. The Newlands railway system comprises 190km of single track and runs along the general alignment of the Bowen Developmental Road. It passes between the Newlands and Abbot Point Coal Terminal and currently services the Newlands, Sonoma and Collinsville mines. At full production the project would generate about 1764 train movements a year each carrying 6800t of coal. This equates to less than 5 train movements per day. When combined with the existing train movements of around 10 per day, the proponent has calculated that there would still be about 27 unused train movements per day within the approved rail capacity. The relative infrequency of daily train movements generated by the project is expected to have a negligible impact on vehicle movements at interface points between the road and rail network. A memorandum of understanding (MOU) between DTMR, Queensland Rail (QR) and local government has been developed to periodically review, assess and manage the downstream road/rail impacts of the NML. Conditions and commitments to manage the impacts of the NML include:

- QR would undertake community consultation to inform local government authorities
- QR, DTMR and local councils would develop strategies to assess and manage downstream road/rail crossing impacts for council managed roads
- QR and the North Queensland Bulk Ports Corporation (NQBPC) port authority would undertake a separate assessment of the road/rail interface issues at the Bruce Highway - Abbot Point road junction and develop mitigation measures in consultation with DTMR.

There are a number of existing at grade rail level crossings of State-controlled roads in this area including:

- Collinsville town level crossing at Mt Coolan Road between Bowen Developmental Road and Station Street
- Sonoma Mine access road from Bowen Developmental Road
- The proposed mine site access road from the Bowen Developmental Road.

Recommendation

The proponent should undertake an assessment of the impact of additional project-related train movements on the safety and efficiency of the existing at grade crossings of the State-controlled road network and identify any required mitigation measures.

4.6.3 Ports

Coking and thermal coal mined at the project would be railed to Port of Abbot Point for export. Port of Abbot Point is located about 25km north of Bowen and is managed by the NQBPC port authority. Shipping requirements from Abbot Point would differ between the coal types being produced by the project. Coking coal from the project would be co-loaded onto customers' vessels together with coking coal from other mines in the region. It is estimated that coking coal from the project would be co-loaded onto approximately 60 vessels per year ranging in size from 70,000 to 150,000 deadweight tonnes (DWT). Thermal coal from the project would be fully loaded onto approximately 50 vessels per year ranging in size from 30,000 to 150,000 DWT.

The proponent has signed an agreement with the NQBPC port authority to export the project's coking and thermal product coal from the Abbot Point X50 expansion area which was completed in 2010. The X50 expansion was subject to a separate EIS under the *State Development and Public Works Organisation Act 1971*. Consequently, the Drake Coal Project would export coal from Abbot Point within its approved capacity.

4.7 Waste

Waste management was discussed in Volume 1 - Chapter 8 of the EIS. A regional excavated waste rock geochemical assessment was presented in Volume 1 - Chapter 7 and Volume 2a - Appendix G of the EIS. A site based waste rock geochemical assessment was presented in Appendix D of the SEIS. The EIS adequately addressed the waste identification and management requirements of the TOR.

The primary source of waste from mining operations would be excavated overburden waste rock from open-cut pits and coarse rejects and fine coal tailings from the CHPP. Other wastes generated by the project would include sewage from the STP and solid and liquid waste streams from the MIA and CHPP. The likely volumes generated and proposed disposal methods of excavated waste rock and coarse rejects and fine coal tailings are discussed in sections 4.7.1 and 4.7.2 of this report respectively. The assessment of geochemical characteristics of the excavated waste rock and coarse rejects and fine coal tailings is discussed in section 4.7.3. The assessment and management of sewage waste disposal is discussed in section 4.7.4. The assessment and management of other solid and liquid waste streams likely to be generated by the project are discussed in section 4.7.5.

4.7.1 Excavated waste rock

Overburden and coal would be extracted from a series of mining pits. The target coal seams are A, B, C, E, P and Q and lie in the Moranbah Coal Measures as shown in Figure 3. The coal seams at the project site are alphabetised from the stratigraphically oldest A seam to the youngest Q or Upper Goonyella seam. The overlying R and S coal seams in the Fort Cooper Coal Measures are present on adjacent mining tenures but will not be mined at the project site because they are either not present, or are not economically viable. The overburden and interburden stratigraphic waste rock units are named according to the coal seams between which they lie, from the oldest and deepest AB waste unit to the youngest and shallowest QR waste unit. The Cenozoic Alluvium (CENZ) stratigraphic waste unit represents the overlying soils, and alluvium material near the Bowen River.

Waste rock emplacements would be constructed according to the mine plan discussed in section 2 and shown in Figure 3 of this report. Initially, excavated waste rock would be hauled to out-of-pit waste rock emplacements until sufficient room is available to dispose waste rock in-pit.

Figure 3 - Target coal seams for the Drake Coal Project (Source: SEIS - Appendix D)

CENOZOIC		CENOZOIC ALLUVIUM		CENZ
PERMIAN	BLACKWATER GROUP	FORT COOPER COAL MEASURES		S Waste
				S Seam
				RS Waste
				R Seam
	MORANBAH COAL MEASURES	ZONE OF DISTURBANCE AT DRAKE		QR Waste
				Q Seam - Upper Goonyella
				PQ Waste
				P Rider
				P Seam (+ P Tuff)
				EP Waste
				E seam - Middle Goonyella
				CE Waste
				C Seam
				BC Waste
BACK CK GROUP				B Seam (Lower Goonyella)
				AB Waste
				A Seam
				Exmoor Seam

Table note: 1. Dip of coal seams is set to zero for illustration purposes

A description of each stratigraphic waste rock unit identified on-site and the estimated volume and percentage of each unit is shown in Table 10. The most prevalent stratigraphic waste rock units are the BC, CENZ, CE and AB wastes, respectively. These stratigraphic waste units make up almost 90% of the overall waste that would be excavated on-site. The EP, PQ and QR stratigraphic waste units make up the remaining 10%.

Table 10 - Waste rock descriptions, volumes and percentages (Source: Based on SEIS - Appendix D)

Stratigraphic waste rock unit	Lithological description	Estimated volume (BCM ¹)	Percentage by weight
CENZ	Alluvium and soil	299.1	25.1
QR waste	Fresh sedimentary material	12.6	1.1
PQ waste	Permian sedimentary (sandstone, mudstone, carbonaceous siltstone and intrusives)	21.7	1.8
EP waste	Permian sedimentary (sandstone, siltstone, carbonaceous mudstone and intrusives)	96.5	8.1
CE waste	Volcanolithic sandstone with minor silt and mudstone, sandstone and some intrusives)	137.2	11.5
BC waste	Predominantly sandstone, minor mudstone and intrusives)	491.8	41.3
AB waste	Fine-grained sandstone, siltstone and carbonaceous mudstone	131.9	11.1
Total		1190.8	100.00

Table notes: 1. BCM – bank cubic metres (shown in million bank cubic metres)

The estimated volume of each lithological waste rock group within each stratigraphic waste rock unit and the number of samples analysed from each lithological waste rock group is shown in Table 11. The CENZ stratigraphic unit consists completely of the soil and alluvium lithology. The QR stratigraphic unit consists predominantly of the sandstone lithology, with a small proportion of the siltstone lithology. The PQ stratigraphic unit consists predominantly of the sandstone lithology, with smaller proportions of the siltstone, carbonaceous material, mudstone and intrusives lithological groups, and a tiny proportion of coaly material. The EP stratigraphic unit consists predominantly of the siltstone and sandstone lithological groups, with progressively smaller proportions of the intrusives, carbonaceous material and mudstone lithological groups. The CE stratigraphic unit consists predominantly of the sandstone and siltstone lithological groups, with progressively smaller proportions of the intrusives, carbonaceous material, soil and mudstone lithological groups. The BC waste unit consists predominantly of the sandstone lithology, with progressively smaller proportions of the mudstone, siltstone, carbonaceous material and intrusives lithological groups. The AB stratigraphic unit consists of similar proportions of the mudstone, sandstone, siltstone and carbonaceous material lithological groups, and about half the proportion of the intrusives lithology.

Table 11 – Volume of lithological waste rock groups within each stratigraphic unit and corresponding number of samples analysed (Source: Based on SEIS – Appendix D)

Stratigraphic waste rock units	Lithological waste rock group volumes (bank cubic metres ¹)							Stratigraphic waste rock unit volumes
	Carbonaceous material	Intrusive	Mudstone	Siltstone	Sandstone	Soil/ Alluvium	Coaly material	
CENZ	0.00	0.00	0.00	0.00	0.00	299.1	0.00	299.10
QR waste	0.00	0.00	0.00	2.27	10.33	0.00	0.00	12.60
PQ waste	2.88	1.98	2.36	3.68	10.62	0.00	0.18	21.70
EP waste	11.39	18.50	6.05	33.82	26.74	0.00	0.00	96.50

Stratigraphic waste rock units	Lithological waste rock group volumes (bank cubic metres ¹)							
	Carbonaceous material	Intrusive	Mudstone	Siltstone	Sandstone	Soil/ Alluvium	Coaly material	Stratigraphic waste rock unit volumes
CE waste	10.55	20.12	6.20	34.56	59.25	6.53	0.00	137.2
BC waste	38.70	36.12	78.69	75.23	262.83	0.00	0.00	491.8
AB waste	27.00	13.34	32.31	27.00	32.25	0.00	0.00	131.90
Lithological waste rock group volumes	90.5	90.1	125.6	176.6	402.0	305.63	0.18	1190.8
Total samples	55	32	51	54	110	19	8	329

Table note: 1. BCM – bank cubic metres (shown in million bank cubic metres)

4.7.2 Coarse rejects and fine coal tailings disposal

The CHPP would wash and process ROM coal at a rate of 1400t/h and would produce two waste streams, being coarse rejects and fine coal tailings, which would be stored in three dedicated, on-site, co-disposal facilities as shown in Figure 1 and discussed below. The approximate tonnages of coarse rejects and fine coal tailings predicted to be generated from the CHPP are shown in Table 12.

Table 12 - Coarse rejects and fine coal tailings tonnages and percentages (Source: SEIS - Appendix D)

CHPP waste unit	Volume (BCM ¹)	Percentage by weight
Coarse rejects	32.06	75.0
Tailings	10.72 (dry)	25.0
Total CHPP waste	42.78	100.0

Table notes: 1. BCM – bank cubic metres (shown in million bank cubic metres)

Coarse reject rock material and fine coal tailings from the CHPP would initially be combined and mixed with water to create a slurry and pumped via a pipeline to an above-ground, initial co-disposal dam. The initial co-disposal dam was originally proposed to be located adjacent to Central Pit 3 about 500m from the high bank of the Bowen River. However, a number of submissions on the EIS raised concerns about potential flood related impacts from the Bowen River on the geotechnical stability of the initial co-disposal dam. In the SEIS, the proponent further refined the design of the initial co-disposal dam and relocated its footprint adjacent to Central Pit 4, which is an additional 750m further away from the Bowen River and above the predicted 1-in-5000-year ARI flood level of the Bowen River.

The initial co-disposal dam would be a purpose built, above-ground storage facility with a storage capacity of 5000ML and an additional design storage allowance (DSA) of 1000ML incorporated into the design to allow additional containment during the wet season. The DSA is calculated using the 5% annual exceedance probability (AEP) for the three month wet season. The initial co-disposal dam would be used for the first two years of operation until sufficient space becomes available in Central Pit 1. At that time, the initial co-disposal dam would be decommissioned and progressively rehabilitated. Subject to a geotechnical and permeability assessment of Central Pit 1, coarse reject rock and fine coal tailings would be trucked from the CHPP to Central Pit 1 for progressive in-pit co-disposal commencing in the third year of operations. A geotechnical and permeability assessment of Central Pit 2 would also be undertaken, and if suitable, would receive co-disposed material from the CHPP sometime after the tenth year of operation when Central Pit 1 would be full. If Central Pits 1 and/or 2 are found to be highly permeable or are deemed to be geotechnically unsuitable to be used for co-disposal, additional co-disposal storage would be available in out-of-pit waste rock emplacements associated with West Pits 1 and 2.

The hazard category of the initial co-disposal dam and both of the in-pit co-disposal storages in Central Pits 1 and 2 have been assessed according to the Manual for Assessing Hazard Categories and Hydraulic Performance of

Dams (EHP, 2012). All three dams have been assessed as significant hazard and would require a DSA to be incorporated into the design as additional freeboard storage during the wet season. This requirement would be conditioned in the project EA.

EHP identified that the new location of the initial co-disposal dam is in close proximity to the western edge of Central Pits 3 and 4. Although the initial co-disposal dam would be decommissioned by the time mining commences in Central Pits 3 and 4 (years 15 and 26 respectively), pit stability would need to be assessed having regard to the extra weight of the initial co-disposal dam in close proximity to the pit walls.

Recommendation

The proponent should commission a third-party engineer during the pit certification process to undertake a geotechnical assessment of pit wall stability of Central Pits 3 and 4 in close proximity to the co-disposal dam.

4.7.3 Excavated waste rock and fine coal tailings characterisation

An excavated waste rock and fine coal tailings characterisation report was presented in Chapter 7 of the EIS. However, this report was based on interpolating results from nearby coal mines beyond the boundary of the project area and did not include any site-specific analysis. Subsequently, a site-specific excavated waste rock and fine coal tailings characterisation report was presented in Appendix D of the SEIS. The analyses presented generally met the requirements of the TOR and the results have been appropriately incorporated into the proposed progressive rehabilitation strategy, subject to ongoing geochemical characterisation during project operations.

The results of the site-specific waste rock characterisation and tailings assessment in the SEIS generally supported the initial results in the EIS that there is a low risk of acid drainage and a low to medium risk of saline drainage. There is a risk of metalliferous drainage at neutral to alkaline drainage pH values. The elements of concern are aluminium, arsenic, lead, zinc and selenium, which would only be slightly soluble at the mean leachate pH value of 9.3pH. Consequently, any leachate from the waste rock emplacements would be expected to have limited environmental ecotoxicity risk. The key findings of the site-specific analysis show that:

- all seven lithological waste groups, as well as the tailings, were classified as non-acid forming (NAF) using data from 284 samples
- the slurry pH and electrical conductivity (EC), and chloride analysis of 329 and 280 samples from the excavated waste respectively indicate very high (mean pH9.3) pH values, low (mean 245µS/cm) EC values and very low (mean 78mg/L) chloride values indicating that run-off from the waste rock emplacements would also likely be alkaline, with low salinity
- the slurry pH and EC, and chloride analysis of six composite coal seam samples used as surrogates for CHPP tailings waste indicate very high (mean pH9.3) pH values, low (mean 107µS/cm) EC values and very low (mean 6.7mg/L) chloride values indicating that run-off from the tailings would likely be alkaline, with low salinity
- all seven lithological waste groups, as well as the tailings, had no mean individual total metal value above a global abundance index of three (i.e. 12 to 24 times median soil content) on a scale of zero to six
- all seven lithological waste groups had some leachable metal concentrations above the ANZECC and ARMCANZ 95% freshwater species survival trigger values, from the 92 samples subjected to the Australian Standard Leaching Procedure (ASLP). The mean results indicate that the leachate is generally slightly alkaline (mean of pH8.0) and mildly saline (mean EC of 4,009µS/cm). Leachable sulfate and chloride values were low (means of 3.6 and 8.0mg/L respectively) and would not be expected to detrimentally impact water quality. The elements most commonly elevated were aluminium, arsenic, lead, copper, zinc and selenium, which exceeded the ANZECC and ARMCANZ 95% species survival trigger values for freshwater ecosystems. However, once water hardness corrections are considered, it is likely that many of the reported leachable metals would be only slightly soluble at the alkaline pH values expected in situ. Consequently, drainage ecotoxicity risk of the leachable elements of concern from waste rock is considered low due to solubility constraints
- the six composite representative tailings samples from coal seams A, B, C, E, P and Q had some leachable metal concentrations above the ANZECC and ARMCANZ 95% freshwater species survival trigger values when subjected to the ASLP. The mean results show that leachate values are alkaline (mean pH8.4) and slightly saline (mean EC of 5,523µS/cm), although not at levels that exceed the ANZECC and ARMCANZ stock watering trigger values. All samples returned low leachable chloride (mean of 10mg/L) and sulfate results (mean of 5mg/L), and all samples returned non-detectable leachate concentrations for arsenic and selenium. Leachable concentrations of barium, manganese, strontium and zinc were detected from all composite coal seam samples. Additionally, boron was detected leaching from the A seam sample, and molybdenum from the A, C and Q seam samples. No element leached at mean concentrations that exceeded the stock watering trigger values. However, the mean zinc concentration exceeded the 95% freshwater species survival trigger value. However, once water hardness corrections are considered, it is likely that many of the reported leachable

elements may be only slightly soluble at the alkaline pH values expected in-situ. Consequently, drainage ecotoxicity risk of leachate elements from tailings is considered low

- the carbonaceous material, coaly material and the mudstone lithological waste groups, and the tailings, showed a high dispersivity risk. The siltstone lithological waste group showed a medium dispersivity risk and both the sandstone and intrusive lithological waste groups showed a low to medium dispersivity risk.

Based on the characterisation results, the soil and alluvium lithology, followed by the sandstone lithology appear to be the most suitable lithological waste groups to be used for capping out-of-pit waste rock emplacements. Higher risk, potentially dispersive lithological waste groups that should be managed through on-site encapsulation include the carbonaceous material, the coaly material, the mudstone and tailings, particularly the fresh component of these four waste groups. The intrusives lithology may be useful as a neutralising agent (due to the very high leachable pH) for any marginal acid producing tailings disposed in the initial co-disposal dam.

The surface water management strategies (see section 4.8.2) including the construction of sediment dams and surface water drainage on-site appear appropriate to manage any seepage from co-disposal storages and waste rock emplacements. Furthermore, excavated stratigraphic waste units would be selectively handled to separate the individual lithological waste groups based on geochemical risk of each lithology. The higher risk, potentially dispersive lithological waste groups such as the carbonaceous material, coaly material, mudstone and tailings would be disposed in-pit and capped to minimise potential surface and groundwater contamination. Additionally, the materials with higher geochemical risk would not be used as capping materials during progressive rehabilitation of out-of-pit waste rock emplacements. Ongoing waste rock characterisation would be undertaken during operations to further characterise the waste and amend the waste rock disposal strategy, if required.

4.7.4 Sewage waste

The generation and management of sewage waste is discussed in Volume 1 - Chapter 8 of the EIS. The EIS states that a modular sewage treatment plant (STP) would be constructed south-west of the mining industrial area (MIA) to prevent odour nuisance on-site, as the prevailing wind direction is from the north-east. The modular design of the STP would allow additional modules to be added as the operational workforce increases and peaks at 480 people during year 25. At full capacity the STP would be designed to treat approximately 87,700L of sewage effluent per day (32ML/y) assuming zero losses in treatment process.

Sewage would be treated to meet a Class A+ recycled water effluent quality as defined under the Public Health Regulation 2005. Schedule C3 of the Public Health Regulation 2005 lists the standards for quality of Class A+ recycled water for parameters including residual chlorine, *Clostridium perfringens*, *Escherichia coli*, F-RNA bacteriophages, somatic coliphages and turbidity. Meeting these standards would be a condition of the project EA.

Treated effluent would be collected in a small pond before being irrigated to land via an effluent disposal system. The location of the treated effluent pond is shown in Figure 1A of the Water Management Plan. The area required for daily irrigation would be about 43,850m (4.4ha). An area of this size is available between Central Pit 3 and the eastern Mining Lease boundary and consists predominantly of Vertosol soils (more than 35% clay) that have water retentive properties. The general location of effluent irrigation within the Mining Lease area is shown in Schedule K - Figure 3 of the EM Plan. Sewage sludge would be removed by a licensed contractor to a licensed disposal facility. Consequently, a sludge lagoon is not expected to be required.

Specific conditions for the treatment and disposal of sewage effluent would be included in the project EA. However, the proposed effluent irrigation area shown on the map in Schedule K - Figure 3 of the EM Plan does not provide the context of this area in relation to other project infrastructure on-site. Consequently, the EA condition about the location of the effluent irrigation area cannot be finalised at this stage.

Recommendation

Amend the EM Plan to include a map showing the location of the proposed effluent irrigation area in the context of all project infrastructure on-site.

4.7.5 Other solid and liquid waste

The assessment and management of other solid and liquid waste met the requirements of the TOR. Other solid and liquid wastes would include general waste (e.g. food, packaging), recyclable wastes, scrap steel, regulated waste including hydrocarbons (e.g. oils, grease), detergents, solvents, paints, resins and batteries, tyres and inert building waste (e.g. concrete, sand, aggregate and bricks). The recycling and re-use of waste materials would be the preferred option for the project during both construction and operation. If waste cannot be recycled, it would be taken to the Whitsunday Shire Council landfill. Regulated waste would be removed and disposed of appropriately by a licensed waste contractor. The potential impacts of these waste streams generated by the project include:

- contamination of surface and/or groundwaters and toxic effects to flora and fauna from inappropriately managed

hydrocarbon wastes

- spontaneous combustion of buried tyres releasing greenhouse gas emissions, toxic emissions and visible smoke
- release of chemicals and/or heavy metals into the environment from improper storage or disposal of batteries
- increased incidence of disease-spreading vermin such as mice, rats, birds and insects attracted to food and organic wastes, creating health and amenity issues

A waste management strategy would be developed for the life of the project that would incorporate a suite of mitigation measures to manage and dispose of the project generated waste streams, including:

- recycling and/or disposal of hydrocarbon waste by licenced contractors at suitably authorised facilities
- recycling tyres through commercial contractors, or disposing of tyres according to best practice guidelines
- recycling paper, plastics, glass, aluminium and steel by placing recyclable materials in dedicated containers for collection by a licensed contractor
- collection and disposal of solvents, paints and chemical wastes by waste management contractors
- storing batteries on-site on pallets with drip trays within bunded, sealed and covered areas
- recycling of batteries to the supplier for recovery disposal, or disposal of batteries with general waste via a licensed contractor
- storing used oil/fuel filters in clearly labelled and bunded filter ponds for collection and recycling by a licensed contractor
- storing food and organic wastes in sealed containers for removal from site on a regular basis
- stockpiling and mulching green waste generated from clearing activities for reuse in rehabilitation activities
- storing removable waste in a central waste management area until being removed from site
- draining oil/chemical drums of remaining product for storage in a dedicated bunded area for collection by a licensed contractor for recycling off-site
- using oil/water interceptors to separate water contaminated by oil as a result of any spill and pumping the separated water to sediment dams for re-use on-site for dust suppression and the oil to a storage area for removal by a licensed contractor
- remediating contaminated soil as a result of any significant spill on-site in a dedicated pit area, or collecting the contaminated soil for off-site remediation by a licensed contractor, if on-site remediation is not practical
- storing tyres in small groups in a designated area with no grass or other flammable materials within a 10m radius.

The Department of State Development, Infrastructure and Planning (DSDIP) raised an issue about the capacity of local waste facilities to accommodate general waste generated by the increased population (both resident and non-resident) associated with the proposal, as well as the cumulative effect from other mine and infrastructures projects.

The proponent responded with the following information:

- waste will be disposed to landfill where options for reuse, recycling or energy recovery are considered unfeasible
- domestic wastes will be disposed at licensed facilities, including the municipal refuse tip
- initial discussions held with the Whitsunday Regional Council (WRC) indicate that the waste disposal from the project would not impact upon existing regional facilities
- the proponent would continue working with the WRC to manage demand on municipal waste management facilities and to develop plans for a long-term solution to waste disposal in the Collinsville area, as necessary.

DSDIP was satisfied with the proponent's response.

4.8 Surface water resources

Chapter 9 (Surface water) of the EIS describes the surface water values potentially affected by the project, as well as a water balance during operations. Volume 2 - Appendices H and I of the EIS provided local and regional flood assessments respectively. Volume 3 - Appendix B of the EIS outlined a water management plan for the project. Generally the surface water assessment in the EIS adequately addressed the requirements of the TOR. Below is a summary of the surface water assessment for the project, as well as the major issues raised during the review of the EIS.

4.8.1 Identified surface water values

The project site is located within the Bowen River Catchment, which originates in Eungella National Park and flows in a north-west direction to join the Burdekin River upstream of the Blue Valley Weir. The catchment area of the Bowen River is approximately 9530km². The closest project infrastructure to the Bowen River is Central Pit 3 which is located about 500m north of the high bank. The Bowen River flows into the Burdekin River approximately 80km downstream of the project site. The Burdekin River flows into the Lower Burdekin Basin for approximately another 150km downstream and ultimately discharges into the Great Barrier Reef Marine Park. The Birralelee-Pelican Creek Aggregation listed wetlands (Birralelee-Pelican Creek wetlands), identified as a high ecological value ecosystem under the Burdekin Water Quality Improvement Plan, is located on the Bowen River about 27km downstream of the project site. The Bowen River contains slightly to moderately disturbed waters as defined by the Queensland Water Quality Guidelines 2009. The majority of land uses in the Burdekin Delta Sub-Catchment downstream of the project are associated with irrigated sugar cane and beef cattle grazing.

The project site is drained by two major creeks - Two Mile Creek and Twelve Mile Gully. The majority of the site (70.5km²) drains in a south-west direction into the Twelve Mile Gully catchment, while the northern most portion of the site (18km²) drains in a north-west direction into the Two Mile Creek catchment. Twelve Mile Gully is an upper tributary of the Bowen River. Two Mile Creek flows into Pelican Creek, which is also a tributary of the Bowen River. Twelve Mile Gully and Two Mile Creek are both ephemeral and only flow during, and shortly after, heavy rainfall.

Background surface water quality monitoring data was available from Pelican Creek, Coral Creek and Two Mile Creek at the Sonoma mine located directly to the north of the project site. The results indicate that levels of nitrogen, phosphorus and suspended solids are higher than the Queensland Water Quality Guidelines, which may be due to grazing practices. Turbidity was also greater than the ANZECC 2000 guideline for aquatic ecosystems at most sites. A number of sites have electrical conductivity and aluminium concentrations greater than the ANZECC 2000 guideline values for aquatic ecosystems. Additionally, median concentration of chromium, iron and selenium at some sites within the project area were greater than the ANZECC 2000 guidelines for aquatic ecosystems.

4.8.2 Potential surface water impacts and proposed mitigation measures

Water demand

The estimated water demand for the project at full production is approximately 2300ML per year. Initially, water supply for dust suppression and use in the CHPP would be sourced from capturing overland flow and pumping groundwater seepage and incidental rainfall in mining pits to sediment dams and the initial co-disposal dam. As new mining pits are constructed and the mine ramps up to full production, groundwater seepage and incidental rainfall in the mining pits would be pumped to the co-disposal dams in Central Pits 1 and 2. An allocation of up to 2200ML/y from the Burdekin Falls Dam via the Moranbah-Burdekin pipeline has been obtained from SunWater and would be used for potable water supply and to make up any shortfalls in site water demand. If necessary, potable water for drinking, toilet flushing and hand washing would be treated to comply with the Australian Drinking Water Guidelines (1996). Raw water would be treated in a package plant with a minimum flow capacity of 10m³/day. The package plant would likely involve flocculation/clarification, media filtration and disinfection and carbon filtration, depending on incoming water quality.

Water balance

Water balance simulations using historical climate data have indicated that co-disposal storage and decant water from the mining pits would contribute about 1400ML/y, and during periods of high rainfall the entire water demand for the project could be met from surface water management infrastructure. It is estimated that an additional 50ML/y of water would be captured during times of average wet season rainfall in sediment dams during initial project development, and up to 300ML/y of water would be captured once the project ramps up to full production and all sediment dams have been constructed.

A final void water balance is discussed in the groundwater chapter in section 4.9 of this report.

Discharges

If necessary, controlled discharges would occur from the site water management infrastructure into the Twelve Mile Gully diversion. The geochemical assessment of overburden indicates that there is a low risk of acid and a low to medium risk of saline drainage from the waste rock dumps and that any run-off or leachate from waste rock emplacements into sediment dams would be relatively free from contamination (see section 4.6.3). The run-off calculations from disturbed areas show that operational storage capacity would be adequate for the containment of run-off from catchment areas during storm events up to the 1-in-20-year AEP. Therefore, overflows from sediment dams would be a relatively infrequent occurrence. The sediment dams have been designed with suitable capacity to provide sufficient residence time to settle out sediment material so that water quality of overflows is unlikely to exceed guideline values and would not pose a high risk of harm to the downstream environment.

During extreme rainfall events uncontrolled discharges to the downstream environment may occur. Depending on where uncontrolled discharges occur a number of contaminants could be released into the downstream environment including sediment, heavy metals, fine coal, soluble salts, coal processing reagents (e.g. flocculants, magnetite, etc.), fuels, oils, grease, sewage, cement, sand, aggregate, acid or salts. These contaminants could be released from waste rock emplacements, the initial co-disposal dam, sediment dams, ROM and product coal stockpiles, coal handling areas, the CHPP, train load-out, haul roads, access roads and hardstand areas. However, apart from sediment, salt laden run-off and possibly small amounts of soluble metals from the waste rock emplacements, the other potential contaminants would be expected to be adequately contained within the site water management system due to the flexibility of being able to pump water between on-site water storages. In the event of a pump failure, a replacement pump from a less critical component of the water management system could be used, if required.

Local and regional flood modelling

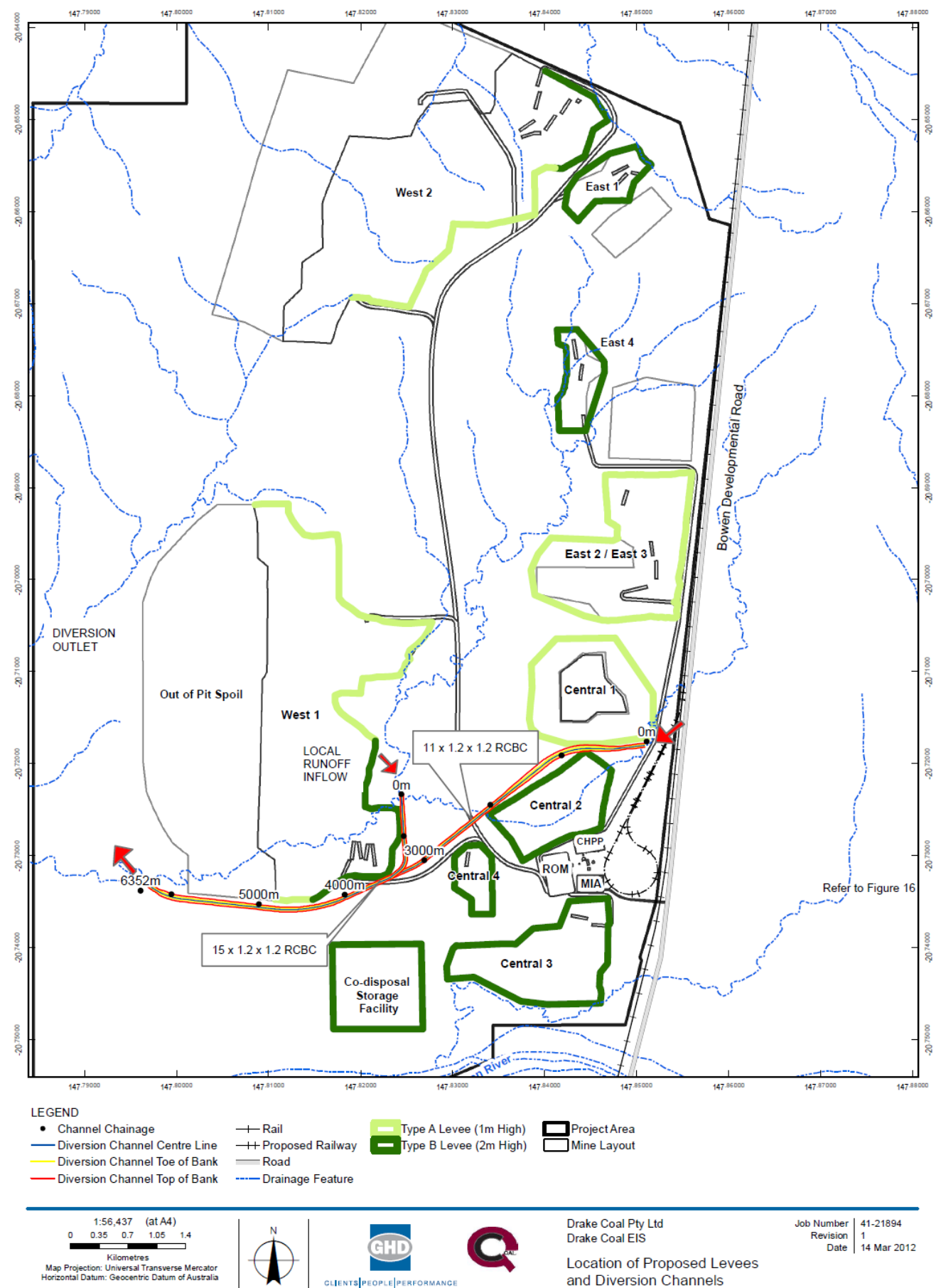
Local and regional flood modelling was undertaken to determine the existing flooding conditions and changes to flooding as a result of the project. Local and regional flood modelling was assessed separately because the floods in local streams within the project area would be expected to peak and recede before the arrival of the flood peak in the Bowen River from the greater upstream region. The results of the local flood modelling in Twelve Mile Gully and Two Mile Creek under pre-development conditions show that the project site is subject to substantial flooding under existing pre-development conditions. As a result of potential inundation of pit areas, flood protection infrastructure would need to be constructed around the perimeter of mine pits and water storages and a diversion of Twelve Mile Gully would be necessary (discussed below). Local flood modelling under developed conditions show that there would be some minor increases in flow velocities and flood levels on the project site. However, flood levels and velocities would remain unaffected downstream of the project boundary.

Regional flood modelling of the Bowen River for the 1-in-100-year ARI flood event showed some very minor flooding in the south-eastern corner of the site in the vicinity of the southern boundary of Central Pit 3. Modelling of the 1-in-5000-year ARI event showed more substantial inundation in the south-eastern corner of the site, with some minor encroachment on Central Pit 3 and some backflow up Twelve Mile Gully. To protect project infrastructure from regional flooding Central Pit 3 would be bunded and Twelve Mile Gully would be diverted.

Twelve Mile Gully diversion

A 6.35km long diversion of Twelve Mile Gully would be constructed to divert creek flows around West Pit 1 and associated waste rock emplacement areas (see Figure 4). Haul road causeway crossings of the Twelve Mile Gully diversion would be constructed at chainages 2250m and 3500m along the diversion. The Twelve Mile Gully diversion channel would be designed to convey the 1-in-1000-year ARI peak flood flows for the majority of its length. However, the 1-in-1000-year flood level would break the southern bank of the diversion between chainages 2000m and 4100m and flow south towards the Bowen River as occurs during existing, pre-development conditions. The flood assessment found that flood levels and velocities as a result of the diversion would remain unaffected downstream at the mining lease boundary. A series of levee banks designed to withstand between 1-in-1000-year and 1-in-5000-year peak flood flows would be constructed around mining pits and infrastructure located adjacent to the creek diversion.

Figure 4 - Location of Twelve Mile Gully diversion and associated flood protection infrastructure (Source: Drake Coal Project EIS)



As identified in section 3.2 of this report, following completion of the EIS process the proponent would need to apply to DNRM for a water licence under the *Water Act 2000* to divert Twelve Mile Gully. The diversion would need to be designed to meet the requirements of the DNRM Guideline - Activities in a watercourse, lake or spring associated with a resource activity or mining operations (version 3). DNRM has assessed the proposed diversion presented in the EIS and has not identified any significant issues that would prevent the diversion from proceeding. DNRM would develop appropriate conditions for the Twelve Mile Gully diversion during the water licence approval process.

Where the excavation or placement of fill in a watercourse associated with constructing the creek diversion cannot be undertaken in accordance with DNRM's Guidelines - Activities in a watercourse, lake or spring associated with a resource activity or mining operations (2012), the proponent would need to apply for a riverine protection permit under the *Water Act 2000*.

The Department of Agriculture, Fisheries and Forestry requires the haul road crossings to comply with the Code for self-assessable development - minor waterway barrier works - Part 3 culvert crossings (April 2013).

It is highly likely that during the construction and initial stabilisation of the Twelve Mile Gully diversion, increased sediment loads may be discharged into the downstream environment. Consequently, a diversion monitoring program would need to be developed according to the requirements of the ACARP Project C9068 - Monitoring and Evaluation Program for Bowen Basin River Diversions. If the monitoring program identifies elevated sediment loads, additional erosion control measures, such as rock armouring, may need to be implemented.

Water Management Plan

The EIS included a water management plan including a series of mitigation measures to manage the potential impacts to surface waters, including:

- run-off from undisturbed areas would be kept separate from disturbed run-off and discharged directly off-site
- coarse rejects and fine coal tailings from the CHPP would be stored in a purpose-built co-disposal dam and in-pit co-disposal areas (see section 4.7.6.2)
- waste rock emplacements would be designed with a minimal surface area to reduce direct rainfall runoff and spoil batters would be constructed from inert spoil material to minimise contaminated runoff
- runoff from waste rock emplacements would be collected in a series of sediment dams and water quality would be tested to ensure that any discharges meet the discharge criteria specified in the project EA
- ROM and product coal stockpiles would be located above regional and local flood levels to minimise catchment areas and reduce the risk of flooding
- runoff from coal stockpiles and the CHPP would be retained on-site in holding facilities and re-used in the CHPP
- the CHPP would be constructed on hardstanding areas and would be bunded to reduce its catchment area and to minimise the mixing of runoff from undisturbed areas
- the train load-out facility would be raised by 0.5m to minimise overland flow over this area and sedimentation from the rail spur would be managed according to the erosion and sediment control plan
- sewage waste would be treated to meet Class A+ recycled water effluent quality and sewage sludge would be removed by a licensed contractor and transferred to a licensed disposal facility (see section 4.6.4)
- levee banks would be constructed around each mining pit (see Figure 2) to prevent excessive accumulation of flood waters in-pit
- accumulated direct rainfall and groundwater inflow into active mining pits would be pumped to co-disposal areas or sediment dams for treatment and reuse or discharge, as appropriate
- levee banks and creek diversions would be designed to manage overland flow and increase flood immunity in active mining areas
- water stored in sediment dams would be monitored monthly and used for dust suppression or process water, depending on water quality
- waste rock emplacement areas would be capped to minimise leachate generation
- co-disposed coarse rejects and fine coal tailings material would be contained on-site and associated runoff would be stored and reused, with the exception of large rainfall events where discharges may be required
- controlled discharges from co-disposal facilities into the Bowen River would only occur during periods of natural flow and would meet the minimum flow requirements and discharge criteria specified in the project EA

- the structural integrity of the co-disposal facilities, levee banks, sediment dams and the diversion channel would be inspected annually and maintenance would be conducted, as required
- upstream and downstream water quality monitoring would be undertaken in accordance with EA conditions to identify any water quality issues and modify the water management system, if required
- levee banks and creek diversions would be designed so that there would be no observable increase in upstream or downstream flood levels or flow velocities beyond the mining lease boundary
- levee banks would be constructed with additional freeboard height to allow for settlement and erosion and would be inspected annually and after significant rainfall events for structural integrity and erosion by an engineer.

Holding facility

The Department of Sciences, Information, Technology, Innovation and the Arts (DSITIA) commented that site water management was not adequately described in the EIS. DSITIA requested further information about the structure referred to as the holding facility, including its storage capacity, likely contaminants and location and function in the water management system. The proponent included in the SEIS the following information about the holding facility and its function:

- an indicative location of the holding facility in Figure 2-8 of the SEIS
- the holding facility would be designed to capture run-off from the coal stockpile areas, the MIA and the CHPP
- water contained in the holding facility would likely be of poor quality containing coal fines, suspended sediments, hydrocarbons and heavy metals (see section 4.6.3 of this report for specific contaminants)
- water contained in the holding facility would not be discharged to the environment
- overflows from the holding facility would be directed to collector basins
- collector basins would be designed to contain the 1-in-100-year ARI flood event
- the design capacity of collector basins would be maintained by periodic sludge removal for disposal within the MAW storages (initial co-disposal dam and Central Pits 1 and 2)
- water stored in the collector basins would also be pumped to the MAW storage dams
- the capacity of the MAW storage dams are identified in Table 10 of the Water Management Plan.

DSITIA considered the additional information and determined that it adequately addressed the issue raised. This information would be used to assist with developing the water management conditions and discharge limits for the project EA.

Water quality guidelines

DSITIA commented that the EIS did not include water quality guidelines for all of the environmental values (including aquatic ecosystems) in order to identify the most stringent water quality objective for each parameter, for use to develop the discharge limits and trigger values conditions in the project EA. The proponent responded in the SEIS with a revised table of water quality guidelines for all environmental values. DSITIA made some additional comments about the table and the proponent incorporated these changes into a revised EM Plan received by EHP on 31 July 2013. DSITIA determined the table of water quality guidelines suitable for the purposes of developing water management conditions for the project EA.

4.9 Groundwater resources

Chapter 15 of the EIS described the groundwater resources and the potential impacts of the project on groundwater values. A groundwater technical report and background monitoring results are contained in Volume 2b - Appendix J of the EIS. A long-term water balance was included in the Water Management Plan in Volume 3 of the EIS. Generally, the groundwater assessment in the EIS adequately addressed the requirements of the TOR. However, limited information was provided about the surface-groundwater interactions and an expanded groundwater monitoring program would be required as outlined below. A summary of the groundwater assessment and major issues identified during the assessment of the EIS is provided below.

4.9.1 Identified groundwater values

The identified environmental values of groundwater in the vicinity of the project are the availability of groundwater for agricultural use, predominantly beef cattle grazing (with some intensive cell grazing) and slightly to moderately disturbed aquatic ecosystems, as defined by the Queensland Water Quality Guidelines (DERM, 2009), Environmental Protection (Water) Policy 2009 and ANZECC & ARMCANZ (2009). A search of the DNRM

groundwater database identified 53 registered bores within 10km of the Drake Coal Project site. Of these bores, only four are recorded as existing water supply bores, the closest of which is located 5.4km to the east of the project area. A total of 20 bores are identified as existing, but with no use recorded. In some cases these bores may be used for water supply. The closest of these bores is located 3km north of the proposed West Pit 2. The other bores are either monitoring or investigation bores (21 bores) or bores that have been abandoned or destroyed (8 bores).

DNRM commented on the EIS that the DNRM groundwater database, while being a useful tool, it is not a complete record of bores in the area because prior to 2002 there was no legislative requirement for drillers of water bores in this area to supply drilling logs to DNRM. Therefore, the number of bores being used for water supply is currently unknown. DNRM identified that a landholder bore survey is the most appropriate mechanism for determining the number of private bores and their purpose.

Recommendation

The proponent should conduct a landholder bore survey at least 12 months prior to any dewatering activities on the site to determine the number of water supply bores that occur within the predicted maximum cone of influence shown in Figure 2-10 of the Drake Coal Project - SEIS Report (February 2013) and expand the background groundwater monitoring program, if necessary.

The EIS identified the targeted Moranbah Coal Measures as generally having low yields of less than 0.1 litres per second (L/s) but the maximum yield recorded was 5L/s. Groundwater monitoring bores used to determine groundwater quality in the project area are located in and around the central and southern areas of the site. A number of monitoring bores are also located to the east of the project site within the adjacent Jax project area. Groundwater quality was found to be generally worse along the eastern boundary of the project site and in the adjoining Jax project area to the east of the project site. Total dissolved solids (TDS) was found to vary widely from 1200mg/L in the southern part of the project site, up to 9250mg/L in the central area on the eastern mining lease boundary. Sodium concentrations ranged from 660mg/L in the central area of the project site, up to 1870mg/L in the central area on the eastern mining lease boundary. All sodium levels measured on-site exceeded the Australian Drinking Water Guideline aesthetic (taste) level of 180mg/L, and results in all but one of the monitoring bores on-site and on the adjacent Jax project site also exceeded the ANZECC guideline upper irrigation trigger level of 700mg/L. Concentrations of most metals were typically below the guideline levels for livestock, irrigation and human consumption. However, barium levels ranged from 3.99mg/L up to 14.1mg/L in the bore located in the central area of the eastern mining lease boundary, which substantially exceeded the drinking water guideline value of 0.7mg/L. Also, manganese levels from two samples were 0.579mg/L and 0.854mg/L in the bore located in the central area of the eastern mining lease boundary, which exceeded the drinking water guideline value of 0.5mg/L, as well as the ANZECC long-term irrigation trigger level of 0.2mg/L, and the ANZECC livestock drinking water guideline value of 0.1mg/L. Selenium levels in one sample from one bore in the southern part of the adjoining Jax project was measured at 0.03mg/L, which exceeded the drinking water guideline value of 0.01mg/L, and the livestock drinking water and long-term irrigation trigger values of 0.02mg/L.

4.9.2 Potential groundwater impacts and proposed mitigation measures

The predicted maximum rate of pit groundwater inflow ranged from 0.107ML/d in East Pit 4 up to 2.956ML/d in West Pit 2, which correlated to a predicted maximum cone of influence of 0.956km up to 5.708km respectively. However, a licence under the *Water Act 2000* to take or interfere with groundwater is not required because the project area is not managed for groundwater under the relevant water resource plan, and is not located in a declared sub-artesian area.

The maximum predicted cone of influence for West Pit 1 and Central Pits 2 and 3 extend to beyond the Bowen River and impacts on groundwater levels in the overlying Bowen River alluvium and associated flows in the Bowen River are possible. The EIS predicted a combined maximum impact on flows in the Bowen River to be 0.47ML/d with all three pits operational during years 11 to 15 of the mining operation. However, due to the limited understanding of how water in the alluvium along the Bowen River interacts with groundwater, an expanded groundwater monitoring program would be required to gain a better understanding of the surface-groundwater interactions (discussed below).

Monitoring bores installed in the Quaternary alluvium associated with the Bowen River were found to be dry during drilling. Groundwater levels were subsequently observed between March and May 2010 towards the base of the 15m sand unit, which suggests unconfined conditions in the alluvium. Due to the ephemeral nature of the watercourses on-site associated with the Bowen River, any quaternary alluvium associated with these watercourses would be expected to be dry for most of the year. Groundwater quality data for the alluvial aquifer underlying the Bowen River is limited to electrical conductivity (EC) readings from a single borehole located to the south-east of the project area. EC data are available for this bore for the period from November 1975 to May 1980 and indicate relatively low EC values, of between 297µS/cm and 1040µS/cm, based on the 10 readings available. No information on typical yields from the alluvium is available and based on current information none of the existing

water supply bores identified within 10km of the project site appear to extract from this unit (subject to confirmation by completion of a landholder bore survey discussed above). However, monitoring bores to the north and south of the Bowen River indicate reasonable thickness of sand and gravel, which suggests that reasonable yields may be possible, if recharge was available.

The proponent acknowledged in the EIS that surface-groundwater interactions between the alluvium and the underlying Moranbah coal measures are not well understood and further monitoring of the timing, direction and magnitude of any vertical gradients would be required to better define the groundwater-surface water interaction along the Bowen River.

DNRM identified in its review of the EIS that the relationship between the Bowen River, the Bowen River alluvium and the underlying coal measures is poorly understood. DNRM requested that an expanded groundwater monitoring program be developed. The monitoring program should include additional monitoring bores on the project site in the alluvium that is connected to the Bowen River, Moranbah coal measures (adjacent to the Bowen River) and adjacent geological formations like the Exmoor formation and the Blenheim subgroup that occur within the maximum cone of influence. The monitoring program should be implemented prior to mining to establish background conditions and to subsequently monitor the impacts of the mining operations as mining progresses.

Recommendation

The proponent should prepare a groundwater monitoring program comprising the groundwater aquifers to be monitored, the number of monitoring bores, the location of the monitoring bores and the groundwater levels and groundwater quality. Additional monitoring bores in the alluvium connected to the Bowen River, the Moranbah coal measures adjacent to the Bowen River and the adjacent Exmoor formation and the Blenheim subgroup should be incorporated into the existing groundwater monitoring program at least 12 months prior to the commencement of dewatering activities.

A groundwater monitoring program would be included in the EA conditions to incorporate the above DNRM recommendation (Appendix 2).

The EIS identified the following potential impacts of the project on the Moranbah coal measures and alluvial aquifers:

- dewatering to allow construction of suitable foundations for site access, rail loadout, ROM pad and CHPP
- dewatering and earthworks associated with the construction of the Twelve Mile Gully diversion
- dewatering of the open-cut mining pits and associated drawdown
- seepage of co-disposed material into groundwaters from the initial co-disposal dam, in-pit co-disposal storages in Central Pits 1 and 2, or out-of-pit waste rock emplacements associated with West Pits 1 and 2 (see section 4.6.2 for details about co-disposal of coarse rejects and fine coal tailings)
- seepage of acidic and/or saline leachate from waste rock emplacements (see section 4.7.3 for details about waste rock and tailings geochemical characterisation)
- leakage from fuel storage, workshop and coal stockpile areas.

Final void water balance and quality

All final voids would be completely backfilled or bunded to above the PMF level to prevent the inflow of overland flow (see section 2 of this report). The long-term water balance in the final voids after mining ceases conservatively estimated evaporative losses of 1300mm/y, which according to the revised surface area of the final voids (see Section 2), equates to about 16ML/d. The evaporative losses would significantly exceed the predicted pit inflow from the coal measures of up to 3ML/d. Consequently, the final voids are expected to remain dry, except during heavy rainfall events when direct rainfall would temporarily accumulate until evaporative losses recommence.

Void water salinities may increase as a result of evaporative concentration processes. However, the deteriorating water quality is not expected to impact on surrounding groundwater aquifers, because the voids are expected to operate locally as a groundwater sink and water levels in the void are not expected to rise above existing groundwater levels in the coal seams.

The EIS identified the following mitigation measures to manage the impacts on groundwater resources:

- ongoing groundwater quality monitoring to ensure compliance with the water quality objectives for the identified environmental values
- fuel storage, refuelling, washdown areas and CHPP operations would be located on hardstanding areas and would be bunded to prevent the release of contaminants to groundwaters

- run-off from hardstanding areas would be stored and treated in oil-water separators according to the requirements of the Erosion and Sediment Control Plan
- make good arrangements would be entered into by the proponent with any landowners where groundwater monitoring indicates that an impact on groundwater supply bores is occurring
- see section 4.8.2 (Surface water management) for additional mitigation measures that also apply to groundwater management.

Major groundwater issue raised in the EIS

DNRM commented on the EIS that an assessment of the cumulative impacts of the project and other projects in the area on groundwater resources had not been provided. The proponent responded in the SEIS with the following information about cumulative impacts on groundwater resources:

- cumulative impacts on groundwater predominantly relates to an accumulation of dewatering related drawdown from the Drake, Jax and Sonoma coal projects
- the smaller scale of the Jax and Sonoma projects resulted in smaller predicted drawdown cones of influence
- the predicted cumulative maximum cone of influence for all three projects was calculated to be only marginally more extensive (a minor protrusion to the north-east) than was predicted for the Drake Coal Project
- the prediction is highly conservative based on dewatering activities occurring at the same time and pumping continuing for a sufficient period of time to achieve steady state drawdowns at each mining pit.

DNRM considered the additional information provided by the proponent and determined that it had adequately addressed the issue raised, subject to the implementation of a comprehensive groundwater monitoring program discussed in section 4.8.1.

4.10 Air quality

Air quality was discussed in Volume 1 - Chapter 11 and a technical assessment was provided in Volume 2b - Appendix L of the EIS. The air quality assessment is considered satisfactory and adequately meets the requirements of the TOR. The EIS adequately described the existing air environment and airshed that may be affected by the construction or operation of the Drake Coal Project. A summary of the air quality assessment is outlined below.

4.10.1 Identified air environmental values

The existing airshed is generally rural and sparsely populated. Local terrain is relatively flat with no significant topographical landscape features that would affect air dispersion patterns. The only known significant industrial source of air emissions near the project is the Collinsville Power Station, located about 10km to the north.

Particulate matter is the primary source of air pollutant expected to be generated by the project. The types of particulate matter assessed for the project include PM_{2.5}, PM₁₀ and total suspended particulates. The main potential sources of particulate matter are from other mining operations and agricultural activities. There are 10 residential properties within 4.5km of the mining lease boundary, with the closest sensitive receptor being the Sonoma Homestead which is located 2.8km from the northern project boundary. The Sonoma mine operates about 2km to the north and the Newlands-Abbot Point rail line and Bowen Developmental Road abuts the project's eastern boundary. Collinsville town centre is located 10km to the north of the closest proposed mining activities. The predominant wet season winds are from the east, with some winds from the north and south-east. The predominant dry season winds are from the east and south-east. All sensitive receptors are located to the north and south of the project site.

The air quality objectives at the site boundary are:

- 25µg/m³ for PM_{2.5} (24 hour)
- 50µg/m³ for PM₁₀ (24 hour)
- 90µg/m³ for total suspended particulates (annual)

4.10.2 Potential air impacts and proposed mitigation measures

The air quality assessment used the Ausplume version 6.0 dispersion model incorporating source characteristics and operational activities with meteorology representative of the project area. Modelling of the projects' potential sources of emissions to air, expected composition of emissions including PM₁₀, PM_{2.5} and total suspended particulates (TSP), and fate of these emissions was undertaken for three scenarios: years three to five; years 11 to

15; and years 21 to 25, as they represent the periods with maximum site preparation (e.g. land clearing, overburden excavation and wind erosion) and production activities (e.g. coal recovery, processing and transport) that have the highest potential to cause significant off-site impacts. Emissions from site preparation and production activities were modelled separately for greater accuracy. Modelling results and conclusions are:

- the highest predicted 24-hour PM₁₀ levels during construction and operation activities are less than 50µg/m³ at the mining lease boundary
- the Queensland Environmental Protection (Air) Policy 2008 objectives of 50µg/m³ for 24-hour PM₁₀ and 25µg/m³ for 24-hour PM_{2.5} concentrations respectively, would be met at all sensitive receptors, including Collinsville, for all three modelled scenarios with the implementation of mitigation measures
- all relevant Environmental Protection Policy (Air) and National Environmental Protection Measure (NEPM) (Air) air quality objectives and goals would be met for the 26 year mine life at all sensitive receptors, including Collinsville
- dust deposition rates are not anticipated to have a significant impact on native vegetation, pastures or cattle productivity and are predicted to be well below a conservative tolerable limit of 400 milligrams (mg) per metre squared per day (mg/m²/day)

To achieve these outcomes the EIS proposed the following mitigation measures:

- operating and maintaining vehicles and equipment according to manufacturers' specifications to minimise exhaust emissions
- using defined haul roads to traverse unsealed surfaces to reduce point source dust emissions
- spray sealing gravel roads to and from the project site to minimise dust emissions from project traffic
- limiting vehicle speeds on unsealed surfaces
- watering exposed coal stockpiles and ROM surfaces to reduce nuisance dust emissions
- watering or using chemical dust suppressants on access roads and exposed working areas
- covering areas of disturbed soil, stockpiles and temporary spoil areas with mulch or other dust suppressant cover materials
- not permitting vegetation to be burnt on-site
- revegetating areas of disturbed soil as soon as possible
- covering exposed coal faces in final voids with inert spoil to prevent spontaneous combustion
- monitoring ambient air quality around the mine to ensure compliance with air quality limits.

The modelling identified some exceedances of the PM₁₀ air quality objective at the site boundary. A series of high level mitigation measures sourced from Table 3 of the National Pollution Inventory Emission Estimation Technique Manual for Mining (NPI, 2000) were also recommended to be implemented for the project in the event that ongoing air quality monitoring shows any non-compliances at the site boundary. These measures include:

- constructing windbreaks by planting additional trees around site preparation works
- using water sprays on trucks prior to unloading
- watering down areas prior to using scrapers
- using water sprays on loading and unloading stockpiles
- constructing windbreaks around stockpiles to reduce wind erosion
- constructing enclosures around miscellaneous transfer points
- constructing an enclosure around train loading facilities.

Major air issues raised in the EIS

The Mackay Conservation Group and one public submission on the EIS raised concerns about only using twelve months of wind rose data for calculating wind speed and direction in the air modelling for the project. The proponent responded by confirming that meteorological data used in the modelling contains hourly data covering a period of twelve months with a good spread of seasonal variations that are representative of meteorological conditions in the area. The modelling methodology used all possible combinations of real (i.e. locally measured) meteorological conditions throughout a full year to assess the worst-case conditions.

One public submission raised concerns that PM_{2.5} levels were found to be around 3 times higher than PM₁₀. However, a review of Table 11-5 in the EIS found that the data for PM_{2.5} and PM₁₀ had been transposed, and in fact PM₁₀ was estimated to make up three times more of the overall dust fraction than PM_{2.5}, which is as would be expected.

EHP requested the proponent to calculate dust deposition rates at sensitive receptors to ensure that the levels would be below the EHP recommended nuisance criterion maximum of 120mg/m²/day calculated on a monthly basis. The proponent undertook additional modelling to assess the levels of dust deposition at sensitive receptors and provided the results in the SEIS. However, the results were presented as annual average dust deposition rates at sensitive receptors and a comparison with the EHP nuisance criteria maximum could not be undertaken. However, the proponent stated in their response that the modelled impact from the mine at the identified sensitive receptors was predicted to be no more than 1% of natural dust fallout. Furthermore, the proponent has committed in the EM Plan to meet the dust deposition nuisance criterion. Consequently, dust deposition monitoring and reporting would be conditioned in the project EA (Appendix 2) to ensure that the dust deposition nuisance criterion of 120mg/m²/day calculated on a monthly basis is met at all sensitive receptors.

The Mackay Conservation Group and one public submission on the EIS raised concerns about fine coal dust emissions from the project, particularly in the particle size range of PM_{2.5} microns in diameter. Of particular concern was the lack of PM_{2.5} monitoring proposed to be undertaken for the project. However, it is generally accepted that particles with a diameter of PM_{2.5} are generated primarily from combustion sources. Given that there would be no major combustion sources on the project site, PM_{2.5} particles are not expected to be elevated. Consequently, PM_{2.5} monitoring is not proposed to be included as a condition of the EA.

Transport of coal from the project site to Port of Abbot Point for export could generate coal dust emissions, as well as result in fouling of rail ballast. Uncontrolled coal dust emissions can have a negative impact on sensitive receptors. While, rail ballast fouling has a significant economic impact due to a reduction in rail capacity as a result of railway line closures to undertake ballast cleaning and track maintenance.

DTMR will require measures to be implemented to mitigate the loss of coal from rail wagons and reduce coal dust emissions. As a minimum, mitigation measures must be in accordance with the QR National Coal Dust Management Plan and must include the implementation of loaded coal wagon veneering systems, which is being implemented across all Central Queensland coal mines that use the QR National rail network.

The proponent agreed in the SEIS to engage with QR National and comply with all requirements for coal dust mitigation on the rail network.

Recommendation

It is recommended that the proponent liaise with DTMR during the negotiation of access agreements to ensure that appropriate mitigation measures are implemented to manage coal dust emissions and the loss of coal from rail wagons.

4.10.3 Greenhouse gas

Volume 1 - Chapter 11 of the EIS included a summary of predicted greenhouse gas emissions and Volume 2b - Appendix L of the EIS included technical information about how the assessment was undertaken. The greenhouse gas assessment adequately addressed the requirements of the TOR. The greenhouse gas assessment was undertaken in accordance with current Australian best practice in greenhouse gas accounting, including the Greenhouse Gas Protocol - A Corporate Accounting and Reporting Standard; Life Cycle Assessment (ISO 14040 series); National Carbon Accounting Toolbox; and the National Greenhouse Accounts Factors, July 2010.

The construction phase assessment concluded that machinery used for vegetation clearing is expected to contribute 96.29% of overall construction emissions. The operation phase assessment concluded that coal shipping and fugitive emissions are expected to have the greatest contribution to the total emissions from the project, with diesel combustion, energy used to make project materials and electricity use the other major contributors. The total emissions over the life of the project are estimated to be 16.9Mt CO₂-e, which is 0.41% and 0.11% of the state and national greenhouse gas emissions reported in the Department of Climate Change and Energy Efficiency State and Territory Greenhouse Gas Inventories 2009, respectively. The annual emissions during project construction are estimated to be 509,780t CO₂-e/year. The annual emissions during project operation are estimated to be 631,809t CO₂-e/year. The emissions from the combustion of coal extracted from the project are estimated to be 16.2Mt CO₂-e/year.

The EIS proposed a series of greenhouse gas reduction measures in accordance with the hierarchy of avoidance, mitigation and offsetting, for consideration and implementation during the design, construction and operation of the project. The measures proposed are considered adequate for the project.

The Mackay Conservation Group and one public submission raised an issue about likely impacts of the project's greenhouse gas emissions on Queensland and the Great Barrier Reef. Of particular concern were:

- the implications of higher wind speeds over areas with less vegetation spreading dust pollution further
- the ability of the proponent to successfully rehabilitate mined lands if less water is available due to increased temperatures
- higher than normal spring and summer monsoonal rainfall increasing the intensity of flooding and affecting mining infrastructure such as levees and diversions causing downstream water quality impacts

The proponent responded with the following information:

- greenhouse gases likely to be generated by the project are insignificant compared to the global carbon cycle
- over the life of the mine climate changes are likely to be within the climatic variability already associated with the past 30 years
- increased temperatures do not necessarily result in stronger winds or devoid the landscape of vegetation
- it is agreed that over recent decades monsoonal rains have increased as shown by the extreme La Nina double-event of 2010/11 to 2011/12
- above average rain is possible to the extent that mining operations could have issues dealing with excessive water (see section 4.7 for the surface water assessment).

The Mackay Conservation Group was not satisfied with the proponent's response and reiterated their concerns that:

- every incremental addition of greenhouse gases to the atmosphere and oceans as a result of human activities now has an adverse impact, no matter how small, and must be addressed
- the project's greenhouse gas emissions cannot be dismissed as insignificant as they are an adverse addition to the normal global carbon cycle
- the climatic variability over the past 30 years does not deal with the increase frequency of extremes in high temperatures and monsoonal rainfall that is accompanying climate change
- increased temperatures increase transpiration rates of vegetation as long as sufficient soil water is available to meet transpiration needs and as long as temperatures do not exceed the physiological capacity of the plant species to tolerate them
- rising prolonged temperatures under global warming would exceed the temperature threshold of many plant species thus reducing vegetative cover
- Less vegetation cover means less wind resistance and hence higher wind speeds and more dust and erosion
- Monsoonal rainfall would result in more erosion of denuded and reduced vegetated surfaces.

In response, the proponent stated that it would comply with greenhouse gas legislation as it applies to the project and approvals process.

While it is acknowledged that the greenhouse gas emissions from the project could have an adverse impact on the normal global carbon cycle, current government policy does not require the proponent to reduce or offset its emissions.

4.11 Noise and vibration

Chapter 12 (Noise and vibration) and Appendix M (Noise and vibration impact assessment) of the EIS described the existing local acoustic environment; identified sensitive receptors potentially affected by noise and vibration emissions from the project; established relevant noise and vibration criteria; predicted the noise and vibration levels likely to be experienced by sensitive receptors from the project; and provided mitigation measures for receptors where predicted noise and vibration levels are likely to exceed relevant criteria. The EIS adequately addressed the noise requirements of the TOR. No major noise issues were raised on the EIS and noise conditions proposed for the project EA are considered adequate to manage the potential noise impacts of the project. A summary of the noise assessment is provided below.

4.11.1 Identified acoustic environmental values

The local area is predominantly associated with rural land uses with some residential properties in the vicinity of the project. The existing acoustic environment is generally rural and sparsely populated. Local terrain is relatively flat

with no topographical landscape features that would affect noise dispersion patterns. The only significant sources of noise emissions near the project are the Jax and Sonoma coal projects, located directly to the east and north of the project site, respectively. The location of sensitive receptors in relation to the project site is discussed in section 4.10.1 of this report.

The noise objectives and goals at the site boundary are:

- Day-time noise of 36dB(A)
- Evening noise of 31dB(A)
- Night-time noise of 28dB(A)
- Low frequency noise of 50dB(Linear)
- Vibration levels of 5 millimetres (mm)/second (s) peak particle velocity (PPV)
- Airblast overpressure levels of 115dB (Linear).

Construction would be undertaken during a 12 hour day shift (6.30am to 6.30pm), with the occasional nightshift, if required. Following construction, mining operations would take place 24 hours a day, seven days a week. Overburden may be blasted between the hours of 9am and 3pm (Monday to Friday) and 9am to 1pm (Saturdays) during project operations. The delivery of materials and equipment during construction and operation would be by truck from Bowen, Collinsville, Mackay, Townsville, Brisbane and Proserpine, via the Bowen Developmental Road, Peak Downs Highway, Bruce Highway and Burnett Highway. The Bowen Developmental Road would be the only road subject to a significant increase in traffic generation as a result of the project. The Newlands-Abbot Point and Northern Missing Link rail lines would be used to transport product coal to the Abbot Point Coal Terminal near Bowen. An EIS to assess the impacts of these rail upgrades was completed and approved by the Coordinator-General of the now Department of State Development, Infrastructure and Planning in 2006. Therefore, the potential noise impacts of the Drake Coal Project using this rail system have been addressed.

4.11.2 Potential noise impacts and proposed mitigation measures

Acoustic modelling was undertaken using the Computer Aided Noise Abatement (CadnaA) model to calculate and assess the effects of project generated noise on sensitive receptors. Predicted noise levels were calculated for construction noise impacts expected during the first 15 months of project life and for operational noise impacts covering the most intense years of mining during years 1, 5, 15 and 26. The results and conclusions are summarised below:

With regard to potential noise impacts during the construction phase:

- worst-case construction noise levels were calculated based on equipment operating: at maximum levels; all at the same time; at the site boundary closest to the sensitive receptors; during downwind weather conditions; without mitigation or natural noise reduction calculations due to changes in topography.
- based on the abovementioned worst-case conditions, construction noise levels for day-time works were predicted to peak at 37dB(A) at the Sonoma homestead and at residential dwelling 3 adjacent to Pelican Creek (as depicted in Figure 12-1 of the EIS). This noise level would be 1dB(A) above the nominated 36dB(A) noise objective. However, a 1dB(A) increase is not expected to be an audible difference at sensitive receptors
- under typical conditions the implementation of mitigation measures such as equipment fitted with silencers and broadband reversing alarms and being regularly maintained, is expected to reduce the day-time noise levels sufficiently to meet the project specific day-time noise goal of 36dB(A)
- while night-time construction noise levels were not assessed, occasional night-time construction activities may be required. Night-time noise levels would be conditioned accordingly in the project EA

With regard to potential noise impacts during the operational phase:

- worst-case operational noise levels were calculated based on adverse meteorology and without mitigation
- based on the abovementioned worst-case operational noise levels day-time and night-time noise levels are predicted to be highest in year 15 with 28dB(A) at Havilah homestead shed and during year 26 with 27dB(A) at Belmore homestead. The levels predicted would meet the day-time, evening and night-time project specific noise criteria goals of 36dB(A), 31dB(A) and 28dB(A) respectively, and are expected to be further reduced by the implementation of noise mitigation measures, discussed below.

With regard to low frequency noise impacts during the operational phase:

- worst-case low frequency noise levels were calculated based on adverse meteorology and without mitigation
- operational low frequency noise levels for day-time and night-time works are predicted to be highest in year 15 with 48dB(Linear) at Havilah homestead shed and during year 26 with 47dB(Linear) at Sonoma Homestead. These levels would meet the low frequency noise criteria goal of 50dB(Linear) and are expected to be further reduced during operations by the implementation of noise mitigation measures
- construction low frequency noise levels were not modelled, but are expected to be less than operational levels due to the smaller scale machinery to be used and would be conditioned appropriately in the project EA
- traffic generated low frequency noise levels on the Bowen Developmental Road are predicted to increase by 1dB, which is not expected to be an audible increase at sensitive receptors

With regard to potential ground vibration impacts due to blasting:

- worst-case ground vibration levels from blasting during operations were calculated based on moist soil conditions where transfer of vibration is maximised
- ground vibration levels were predicted to be well within the vibration criteria limit of 5mm/s peak particle velocity (PPV), with the highest level of 0.7mm/s PPV expected at Belmore and Sonoma homesteads

With regard to potential airblast overpressure impacts due to blasting:

- worst-case airblast overpressure levels from blasting during operations were calculated based on overcast weather conditions, and airblast overpressure levels were predicted to approach or exceed the limit of 115dB(L) at all sensitive receptors when blasting occurs near the project boundary, with the highest levels of 119dB(L) expected at Belmore and Sonoma homesteads.
- However, airblast overpressure levels were also modelled under more favourable sunny meteorological conditions and were predicted to be well below the 115dB(L) limit, with the highest levels of 99dB(A) expected at Belmore and Sonoma homesteads, and levels at all other sensitive receptors expected to range between 93 to 96dB(A).

Mitigation measures

The following mitigation measures are proposed to be implemented to manage noise related impacts during both the construction and operation of the project:

- mobile equipment would be selected to minimise noise emissions; equipment would be regularly maintained and fitted with appropriate silencers; equipment found to be excessively noisy would be replaced, or taken off-line until repairs or modifications can be made
- haul roads would be regularly maintained to minimise potholes and bumps
- a community liaison phone number would be made available to noise sensitive receptors so that noise related complaints can be addressed in a timely manner
- noise sensitive receptors would be notified prior to night-time construction works or any unusual activities (e.g. blasting) that may generate higher than usual noise levels
- broadband reversing alarms would be used for all site equipment, subject to occupational health and safety requirements
- blasting would be undertaken during favourable meteorological conditions to meet the ground vibration and airblast overpressure goals at sensitive receptors
- airblast overpressure monitoring at sensitive receptors during the initial overburden blasts in years one to four in West Pit 1 and Central Pit 1 (which are the most distant blasting locations in relation to sensitive receptors) to test the modelling predictions and optimise blast parameters to achieve the airblast overpressure goal.

4.12 Ecology

Ecology was discussed in Volume 1 - Chapter 13 and Volume 2b - Appendix N of the EIS. The ecology assessment was generally satisfactory and met the requirements of the TOR.

The project is located in the Brigalow Belt Bioregion of the Burdekin catchment area. Land use in the catchment consists of cattle grazing (with some intensive cell grazing), sugar and horticulture cropping, aquaculture, coal mining and water infrastructure. The proposed project area currently operates as an intensive cell grazing cattle property.

4.12.1 Identified ecological values

Five ecological field surveys were undertaken for the project to ground-truth desktop information, identify any additional flora and fauna values and target areas likely to have high ecological value. The surveys included:

- a two week long dry season terrestrial flora and fauna survey in June 2007
- a six day long post wet season terrestrial flora and fauna survey in April 2010
- a three day aquatic macroinvertebrate survey in May 2011
- a two day stygofauna survey in May 2011
- a week long wet season flora and fauna survey in February 2012

Most of the remnant vegetation on the western side of the project site was found to have state significant biodiversity values (SSBVs) due to the presence of at least one endangered regional ecosystem (RE) and this vegetation forms part of a bioregional corridor. The southern margin of the project site adjacent to the Bowen River forms part of a regionally significant bioregional corridor.

According to the EIS thirteen regional ecosystems (REs) were identified within the project area, eight of which have conservation status under the *Vegetation Management Act 1999* (VMA) and/or the EP Act, as follows:

- **RE11.9.10 *Eucalyptus populnea*, *Acacia harpophylla* open forest** listed as of concern under the VMA and having endangered biodiversity status (category B environmentally sensitive area) under the EP Act. RE11.9.10 was ground-truthed and found to exist on-site within 412.5ha of a composite polygon interspersed with *E. crebra* dominated woodland along the central and western portions of the project site
- **RE11.9.7 *Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland** listed as of concern under the VMA and having an of concern biodiversity status under the EP Act. RE11.9.7 was identified in 280.6ha of a complex polygon with RE11.9.9 and RE11.9.10 along the western margin of the project site
- **RE11.9.12 *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla*** listed as endangered under the VMA and having an endangered biodiversity status under the EP Act. RE11.9.12 makes up 145.1ha within the project site
- **RE11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open-forest** listed as endangered under the VMA and having an endangered biodiversity status under the EP Act. This RE is present within four very small patches making up a total of 31.3ha within the project site
- **RE11.3.7 *Corymbia* spp. woodland** listed as least concern under the VMA and having an of concern biodiversity status under the EP Act. This RE makes up 219.7ha and occurs along the southern boundary of the project site as a component of a mixed community adjacent to the Bowen River
- **RE11.3.4 *Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland** listed as of concern under the VMA and having an of concern biodiversity status under the EP Act. This RE makes up 54.9ha and occurs along the southern boundary of the project site as a component of a mixed community adjacent to the Bowen River
- **RE11.3.25 *Eucalyptus tereticornis* or *Eucalyptus camaldulensis* woodland fringing drainage lines** listed as least concern under the VMA and having an of concern biodiversity status under the EP Act. This RE is recorded along the Bowen River within 57ha of the project site
- **RE11.3.31 *Ophiuros exaltatus*, *Dichanthium* spp. grassland** listed as least concern under the VMA and having an of concern biodiversity status under the EP Act. This RE makes up 9.7ha and is located in one small patch within the alluvial mixed woodland matrix in the south of the project area.

Blue-grass (*Dichanthium setosum*) is listed as near threatened under the *Nature Conservation Act 1992* (NC Act) and was the only species of plant identified on the project site having state conservation significance.

Three native and one introduced aquatic plant species were identified, none of which have conservation significance.

The following fauna of conservation significance were identified on the project site during field surveys:

- **squatter pigeon (southern)** (*Geophaps scripta scripta*) listed as vulnerable under the NCA
- **ornamental snake** (*Denisonia maculata*) listed as vulnerable under the NCA.

A total of 15 migratory and/or marine species were recorded in the project area, including **rainbow bee-eater** (*Merops ornatus*), **whistling kite** (*Haliastur sphenurus*), **Richard's pipit** (*Anthus novaeseelandiae*), **black-faced cuckoo-shrike** (*Coracina novaehollandiae*), **Nankeen kestrel** (*Falco cenchroides*), **sacred kingfisher** (*Todiramphus sanctus*), **forest kingfisher** (*Todiramphus macleayii*), **red capped plover** (*Charadrius ruficapillus*),

Dollarbird (*Eurystomus rientalis*), **pallid cuckoo** (*Cacomantis pallidus*), **horsfield's bronze cuckoo** (*Chalcites basalis*), **eastern koel** (*Eudynamys orientalis*), **channel billed cuckoo** (*Scythrops novaehollandiae*), **shining bronze cuckoo** (*Chalcites minutillus*), **southern boobook** (*Ninox novaeseelandiae*).

A likelihood of occurrence assessment was undertaken for all conservation significant species listed under the NCA. The assessment involved reviewing known species information such as distribution, habitat requirements and previous records against project site conditions and habitats identified during field surveys to determine the potential for the species to occur on the project site. The assessment categories included 'likely to occur' and 'may occur'. Species assessed as likely to occur were determined by the species being recorded in the region based on desktop searches and suitable habitat identified by a suitably experienced ecologist during ground-truthing at the project site. Species assessed as may occur have not been recorded in the region based on desktop searches, although species' distribution incorporates the project site and potentially suitable habitat was identified by a suitably experienced ecologist during ground-truthing at the project site. The following flora and fauna species have been identified as likely to occur, or may occur:

Likely to occur:

- **king blue-grass** (*Dichanthium queenslandicum*) listed as vulnerable under the NCA
- **black ironbox** (*Eucalyptus raveretiana*) listed as vulnerable under the NCA
- **little pied bat** (*Chalinolobus picatus*) listed as near threatened under the NCA
- **koala** (*Phascolarctos cinereus*) listed as special least concern under the NCA
- **short-beaked echidna** (*Tachyglossus aculeatus*) listed as special least concern under the NCA.
- **great egret** (*Ardea alba*)
- **cattle egret** (*Ardea ibis*)
- **white-bellied sea-eagle** (*Haliaeetus leucogaster*)
- **salt-water crocodile** (*Crocodylus porosus*).

May occur:

- **quassia** (*Quassia bidwillii*) listed as vulnerable under the NCA
- **red goshawk** (*Erythrorhynchus radiatus*) listed as endangered under the NCA
- **black-chinned honeyeater** (*Melithreptus gularis*) listed as near threatened under the NCA
- **cotton pygmy-goose** (*Nettapus coromandelianus*) listed as near threatened under the NCA
- **black-throated finch** (*Peophila cincta cincta*) listed as vulnerable under the NCA
- **yakka skink** (*Egernia rugosa*) listed as vulnerable under the NCA
- **brigalow scaly-foot** (*Paradelma orientalis*) listed as vulnerable under the NCA.

The macroinvertebrates found in the Bowen River and Jack Creek were indicative of healthy waterways with a number of pollution sensitive species present. A diversity of macroinvertebrates was also found in Two Mile Creek. Twelve Mile Gully (the only waterway not flowing at the time of the survey) consisted of unlinked remnant pools which appeared to be in a condition consistent with slightly to moderately disturbed aquatic ecosystem.

No stygofauna were recorded from any of the groundwater samples obtained during the pilot survey. Low abundances of terrestrial (non-stygofauna) invertebrates were recorded from some samples, typical of ingress from surface environments.

4.12.2 Potential ecological impacts and mitigation measures

The potential impacts of the proposed project on State significant biodiversity values (SSBVs) and proposed avoidance and mitigation strategies identified in the EIS include:

Regional ecosystems of state significance:

RE11.9.10 *Eucalyptus populnea*, *Acacia harpophylla* open forest: A total of 2.8ha of this of concern RE would be cleared and 409.7ha would be retained within the project area. The cleared RE would be offset as discussed in section 4.12.3 of this report.

RE11.9.7 *Eucalyptus populnea*, *Eremophila mitchellii* shrubby woodland: This of concern RE makes up 280.6ha within the project area, none of which would be cleared as a result of the project.

RE11.9.12 *Dichanthium sericeum* grassland with clumps of *Acacia harpophylla*: This endangered RE makes up 145.1ha within the project area, none of which would be cleared as a result of the project. The retained grassland would be improved through restoration, weed management, management of cattle and rehabilitation.

RE11.9.5 *Acacia harpophylla* and/or *Casuarina cristata* open-forest: A total of 8.9 ha of this endangered RE would be cleared and 22.4ha would be retained within the project area. The cleared brigalow would be offset as discussed in section 4.12.3 of this report. The remaining brigalow would be improved through restoration, weed management, management of cattle and rehabilitation.

RE11.3.4 *Eucalyptus tereticornis* and/or *Eucalyptus* spp. tall woodland: A total of 8.8ha of this of concern RE would be cleared and 46.1ha would be retained within the project area. The cleared RE would be offset as discussed in section 4.12.3 of this report.

Flora and fauna species (likely to occur):

King blue-grass (*Dicanthium queenslandicum*): While king blue-grass was not recorded during field surveys, potential habitat for king blue-grass would be impacted by clearing 9.3ha of native grassland vegetation communities. However, a revision of the mine plan (outlined in section 2 of this report) resulted in a revised impact area of 2.3ha. The revised impact area was assessed as not likely to have a significant impact on the species and offsets are not proposed. Also, 155.7ha of native grassland vegetation communities on-site that may contain king blue-grass and/or provide suitable habitat for king blue-grass would be retained and improved through weed management and management of cattle

Black ironbox (*Eucalyptus ravertiana*): While not recorded in the project area during field surveys, black ironbox is likely to occur on the project site and its habitat values will be preserved by retaining 57ha of suitable habitat adjacent to the Bowen River.

Ornamental snake (*Denisonia maculata*): There is 31.3ha of brigalow on the project site that provides habitat suitable for the ornamental snake which was identified during the field surveys. As stated above, the 8.9ha of brigalow that would be lost due to clearing would be offset as discussed in section 4.12.3 of this report. Similar suitable habitat for the ornamental snake has been identified in nearby areas and there is no likelihood of significant impact of the project on habitat fragmentation, connectivity and condition for the ornamental snake. The most likely impact on the ornamental snake is injury or mortality by vegetation clearing during the construction phase. Mitigation measures would include covering open trenches or providing fauna ramps to provide a means of escape, checking work areas each day for trapped fauna prior to commencement, employee education about environmental responsibilities, and removing any dead fauna to avoid an increase in the occurrence of predators such as raptors.

Squatter pigeon (southern) (*Geophaps scripta scripta*): A total of 176.5ha of woodland habitat (REs 11.3.30/11.3.9/11.3.7/11.3.4) suitable for the squatter pigeon (southern) would be cleared as a result of the project. Given that the highest quality and most suitable vegetation close to water along the Bowen River is proposed to be retained, the proponent determined that the project would not have a significant impact on squatter pigeon habitats. The loss of squatter pigeon habitat would also be offset as discussed in section 4.12.3 of this report. A total of 3248.4ha of remnant and woodland vegetation on-site suitable as habitat for the squatter pigeon would be retained and improved through the management of cattle and weed and fire management. Active management of non-impact areas of the site for biodiversity during project operation will improve the condition of currently degraded habitats, providing direct benefit for the squatter pigeon.

Koala (*Phascolarctos cinereus*): While the koala was not recorded during field surveys, potential habitat for the koala would be impacted by clearing 176.5ha of the same suitable woodland habitats as is suitable for the squatter pigeon (discussed above). The koala has a broad distribution across a range of habitats, including woodland, open forest and riparian habitats abundant in the region. The loss of koala habitat would be offset as discussed in section 4.12.3 of this report. In total an area of 3265.5ha of remnant vegetation on-site suitable for koala habitat would be retained and improved through the management of cattle and weed and fire management. Of the *Eucalyptus* spp. dominated REs within the project area, potentially higher value koala habitat than that proposed to be cleared is present within REs 11.3.25b along the Bowen River, which would not be directly impacted by the project.

Short-beaked echidna (*Tachyglossus aculeatus*): While not recorded during field surveys, potential habitat for the short-beaked echidna would be impacted by clearing 176.5ha of the same suitable woodland habitats as are suitable for the squatter pigeon and koala (discussed above). The loss of echidna habitat would be offset as discussed in section 4.12.3 of this report.

Migratory and marine species: The three field surveys identified 15 marine and migratory bird species. Based on species distribution and habitat types present on-site four additional migratory and marine species are considered likely to occur on or adjacent to the project site including three bird species and the salt-water crocodile. The project proposal was assessed as not having a significant impact on the birds because they are mostly transient

species that would use the project area sporadically during migration movements. Potential habitat for some of these species may exist on-site, particularly during the wet season. However, the site is unlikely to provide core habitat for feeding, breeding or roosting as there are no wetlands or marine environments on the project site. There is no evidence to suggest that the project site supports an important population of these migratory bird species. Therefore, offsets are not proposed.

The salt-water crocodile is likely to occur in the Bowen River which borders the southern boundary of the project site. The nearest project infrastructure (Central Pit 3) would be located some 500m away from the high bank of the Bowen River. Subject to the implementation of appropriate stormwater management and erosion and sediment control measures to minimise any changes to off-site water quality, the proponent assessed that there is no likelihood of significant impact of the project on the salt-water crocodile. Therefore, offsets are not proposed.

Flora and fauna species (May occur):

Quassia (*Quassia bidwillii*): While not recorded in the project area during field surveys, quassia may occur on the project site and its habitat values will be preserved by retaining 57ha of suitable habitat adjacent to the Bowen River.

Yakka skink (*Egernia rugosa*) and **brigalow scaly-foot** (*Paradelma orientalis*): The yakka skink and brigalow scaly foot may occur on the project site within 3976.5ha of suitable habitat consisting of *Eucalyptus crebra* woodland, *Eucalyptus brownii* woodland and mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. The most likely impact to these reptiles is injury or mortality by vegetation clearing during the construction phase. Similar mitigation measures proposed for the ornamental snake above would be implemented to minimise any impact. Offsets are not proposed for these species because they were not found during surveys and are considered not likely to occur on the project site.

Red goshawk (*Erythrotriorchis radiatus*): While not recorded on the site during field surveys, the red goshawk may occur in 57ha of suitable Eucalypt and Melaleuca woodland habitat along the northern banks of the Bowen River. This habitat would not be impacted by the project and no direct offsets are considered necessary.

Black-throated finch (*Poephila cincta cincta*): While not recorded during field surveys, the black-throated finch may occur in 3976.5ha of suitable *Eucalyptus crebra* woodland, *Eucalyptus brownii* woodland and mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. Potential impacts were not assessed as significant due to the broad scale of suitable habitats available for the black-throated finch and offsets are not considered necessary.

Northern quoll (*Dasyurus hallucatus*): While not recorded during field surveys, the northern quoll may occur in 3976.5ha of suitable foraging habitats on-site, including *Eucalyptus crebra* woodland, *Eucalyptus brownii* woodland, mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. However, there are no rocky outcrops and few dead logs for den sites present on the project site. Therefore, if present it is expected that the northern quoll uses the project site as additional foraging habitat, rather than shelter and breeding. Consequently, potential impacts were not assessed as significant and offsets are not considered necessary.

Cotton pygmy-goose (*Nettapus coromandelianus albipennis*): While not recorded during field surveys, the cotton pygmy-goose may occur in suitable habitat within farm dams. However, given the lack of emergent macrophytes present in farm dams on-site the species is expected to be an infrequent visitor and offsets are not considered necessary.

Black-chinned honeyeater (*Melithreptus gularis*): While not recorded during field surveys, the black-chinned honeyeater may occur in 3976.5ha of suitable woodland and riparian communities within the project site. Offsets are not proposed for this species because it was not found during surveys and is not considered likely to occur on the project site.

Watercourse values:

The definition of a watercourse for the purposes of deciding an offset under the Queensland Biodiversity Offset Policy (QBOP) is defined under the VMA. The watercourse values being impacted by the project were determined by calculating the surface area of remnant vegetation contained within a buffer area on each side of the watercourse determined by the stream order. The SSBVs of the Twelve Mile Gully diversion with a stream order of four have been calculated to be 26.3ha. The impacted watercourse values are proposed to be offset as discussed in section 4.12.3 of this report.

EHP commented that a receiving environment monitoring program (REMP) must be prepared for the project to assess the long-term health of the downstream aquatic environment. The REMP would need to include water quality monitoring, riparian vegetation condition monitoring and the use of aquatic macroinvertebrate communities as indicators of stream health. In response, the proponent committed in the EM Plan to prepare and submit an

REMP according to the requirements of the model mining conditions. The preparation of an REMP would be conditioned in the project EA (Appendix 2).

Connectivity values:

A total of 36.8ha of connectivity SSBVs were identified as being impacted by project activities and the connectivity values are proposed to be offset as discussed in section 4.12.3 of this report.

Major issues assessed in the EIS

Mackay Conservation Group and a public submission on the EIS raised concerns about the potential cumulative impacts of projects in the area on squatter pigeon habitat. The proponent responded to this issue in the SEIS and provided further additional information on 8 July 2013. The additional information highlighted the following key points about squatter pigeon habitat and potential cumulative impacts:

- the combined cumulative impact of the Drake (176.5ha), Sonoma (23ha), Jax (8ha) and Cows (0ha) coal projects on squatter pigeon habitat would be 207.5ha
- the squatter pigeon is known to use a range of habitats including grasslands, grassy woodlands and open forests, particularly those that are in close proximity to water
- squatter pigeon habitat can include vegetation that is remnant, non-remnant, non-native and in good to highly degraded condition
- suitable squatter pigeon habitat is not necessarily limited by condition and potentially suitable habitat for the species in close proximity to water sources remains widespread and abundant in the greater region
- the squatter pigeon also uses grassland habitats and other woodland REs that are present in the sub-region, but are not present on the project site
- vegetation along the Bowen River provides the highest habitat values with the greatest diversity of potential shelter features at ground level in close proximity to water, and this vegetation within the project site would be retained
- a relatively large and intact habitat corridor within the project area would be retained, and would promote fauna movement between the project area and the greater region.

EHP considered the additional information, as well as the proponent's commitment to offset the loss of 176.5ha of squatter pigeon habitat in the offset strategy (see section 4.12.3) and determined that it adequately addressed the issues raised by submissions on the EIS about potential cumulative impacts on squatter pigeon habitat.

DNRM commented on the EIS that even though stygofauna were not identified during the pilot survey, the lack of knowledge about groundwater in the alluvium and that riverine alluvium is a known habitat for stygofauna, further sampling is required to confirm the survey conclusions presented in the EIS. In the SEIS, the proponent committed to undertaking additional stygofauna sampling in the new monitoring bores proposed to be constructed in the alluvium associated with the Bowen River.

Recommendations

The proponent should repeat stygofauna sampling in the new monitoring bores proposed to be drilled to investigate surface water-groundwater interaction. Sampling should be in accordance with Guideline No. 54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia. The bores sampled should be at least 6 months old as per the guidelines.

If stygofauna are identified during the monitoring program that are determined to be endemic to the area and to be at risk of mining related impacts, further sampling should be undertaken and the results should be given to the administering authority.

Whitsunday Regional Council, Mackay Conservation Group and two public submissions on the EIS raised concerns about the potential cumulative impacts of the project and nearby projects on downstream high ecological values (HEVs), including the Birralea-Pelican Creek wetlands. The issue of downstream cumulative impacts on HEVs was also raised by the Commonwealth Independent Expert Scientific Committee (IESC). A response by EHP to the IESC outlining the significance of cumulative impacts and how they would be managed by the EA conditions for the project is provided in section 4.18.5.

4.12.3 Biodiversity offset strategy

A biodiversity offset strategy (BOS) was provided in the SEIS and was later amended and submitted on 8 July 2013 in the response to EHP's information request under section 62 of the EP Act. The BOS generally met the requirements of the TOR. A summary of the BOS is provided below.

The BOS proposes an alternative option to a non-remnant vegetation offset under the Queensland Biodiversity Offset Policy (QBOP) in the form of remnant offset areas within parts of the Birrale Station property (owned by the proponent) to the west of the mining lease areas for the Drake Coal Project. The offset areas are not identified for development and are not currently at risk of being impacted by mining activities as they are located in an area from which the Moranbah coal measures has been eroded. The proposed remnant offset areas have been calculated as shown in Table 13.

Table 13 - Impacted values and proposed strategic remnant offsets for the Drake Coal Project

Environmental value	Impacted regional ecosystem (RE)	Approximate total impact to be offset	Proposed offset areas
Brigalow (<i>Acacia harpophylla</i> dominant and co-dominant)	RE11.9.5	8.9ha	52ha ^{1,2}
Ornamental snake habitat	RE11.9.5		
<i>Eucalyptus populnea</i> , <i>Acacia harpophylla</i> open forest	RE11.9.10	2.8ha	
<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland	RE11.3.4	8.8ha	573ha ^{1,2}
Squatter pigeon (southern) habitat	Composite RE11.3.30/11.3.9/11.3.7/11.3.4	176.5ha	
Koala			
Echidna			
Little pied bat			
Watercourse	REs11.9.5/11.3.4/11.3.7/11.3.9/11.3.30	26.3ha	
Connectivity	REs11.9.5/11.9.10/11.3.4	36.8ha	

1. The size of offset areas have been determined using the Commonwealth EPBC Act offsets assessment guide impact calculator

2. Final size of offset areas is subject to an ecological equivalence assessment

The proposed remnant offsets outlined in Table 6 are proposed to be located in areas outlined below:

- a brigalow and ornamental snake offset area of 52ha proposed to be located in the western part of Birrale Station
- a protected species habitat, watercourse and connectivity offset area of 573ha proposed in the western part of Birrale Station along a 4km stretch of the Bowen River remnant riparian corridor.

A remnant offset can be secured by agreement between Drake and EHP, even though the offset doesn't meet the QBOP requirement of being in non-remnant vegetation, as long as it provides a conservation gain as defined by principle 6 of the QBOP. Principle 6 states:

- Offsets must provide additional protection to environmental values at risk or additional management actions to improve environmental values. Additional protection or additional management actions must be above and beyond any other environmental measures that are already required. Actions taken to avoid or minimise impacts or that are undertaken as part of best-practice design or management are not considered to be additional, and are thus not appropriate as an offset. Specific-issue offsets policies will include guidance on what additional actions are appropriate as an offset.

The QBOP provides guidance on additional actions that are appropriate as an offset on page 6, which states:

- It is the responsibility of the decision-maker to determine whether any additional information submitted with the development application potentially delivers an outcome that is commensurate with the outcome sought by

requiring an offset. Where the applicant can demonstrate that it will satisfy the requirements of the applicable legislation through other means that would not be considered an existing mandatory requirement, the decision maker can accept this as an acceptable alternative solution to an offset.

EHP has assessed the BOS and has determined that the remnant offset option is an acceptable alternative to a non-remnant offset under the QBOP. The 573ha of remnant riparian vegetation along the Bowen River is a key north-south and east-west linkage area in the Desert Uplands/Northern Brigalow Belt strategic investment corridor, making it an area of high conservation value. Furthermore, the remnant vegetation values within the proposed offset areas can be improved through the management objectives of an Offset Area Management Plan (OAMP), and further protected by the legally binding mechanism proposed by the proponent to secure the offsets.

Improvement to the condition of the remnant vegetation values will require management practices which particularly improve the structure of the shrub and ground layers, including retention of woody debris. Section 8 of the BOS includes OAMP actions that would achieve an improvement in condition including management of cattle, weed, feral pest and fire management practices. As the administering authority, EHP would assess and approve the OAMP.

Section 4.1 of the BOS identifies other potential alternative offset locations within four QCoal properties. However, the availability of non-remnant offset areas within these four QCoal properties and an assessment against the purposes and objectives of the QBOP, that was included in an earlier version of the BOS dated 12 April 2013, has been removed from the current version. For any offset locations within these four QCoal properties to be viable alternatives, should the remnant offset proposal fall through for any reason, this information should be re-inserted into the final BOS.

Recommendation

The proponent should amend the BOS to include an assessment of the availability of non-remnant offset locations within the four QCoal properties and assess any identified offset locations against the purposes and objectives of the QBOP to demonstrate that there are viable alternatives, should the remnant offset proposal fall through for any reason.

The impacts on king blue-grass habitat, which is known to occur within the project area, as well as other protected species' habitat, may require clearing permits from EHP's wildlife management branch and/or the development of species management plans. However, the proponent is yet to liaise with EHP's wildlife management branch to determine the nature of these requirements.

Recommendation

The proponent should liaise with EHP's wildlife management branch to determine whether clearing permits and/or species management plans under the Nature Conservation Act 1992 are required for any of the listed threatened species impacted by the project.

The following steps must be undertaken to finalise and secure the biodiversity offset package:

- complete site field verification and detailed ecological equivalence assessments of both the impact and vegetation offset sites to clarify whether the proposed offsets would result in a net benefit for each identified value. Suitable offsets have also been identified in areas of remnant vegetation which can be assessed for net benefit, if required. Field verification and ecological equivalence assessments are proposed to be conducted after the EIS process has been completed
- secure a legally binding mechanism on title
- develop an offset area management plan
- sign a deed of agreement (DOA) with EHP
- within 12 months of signing the DOA, submit to EHP for approval the offset package for all stages of the project.

These steps must be completed prior to commencement of works on site. Also, model conditions for securing the environmental offsets would be included in the project EA (see Appendix 2).

Commonwealth offset requirements are discussed in section 4.18.3 of this report.

4.13 Cultural heritage

Indigenous and non-indigenous cultural heritage are discussed in Volume 1, Chapter 14 and Volume 2b, Appendix O of the EIS. The EIS was found to adequately address both Indigenous and non-indigenous cultural heritage issues and adequately met the requirements of the TOR. The assessment of Indigenous and non-indigenous cultural heritage is summarised below.

4.13.1 Indigenous cultural heritage

The Birri people are the relevant Indigenous party for negotiation of a cultural heritage management plan (CHMP) for the project area. Following negotiations, a CHMP for the Drake Coal Project was signed in July 2011 and was approved under section 105 of the *Aboriginal Cultural Heritage Act 2003* on 6 September 2011. The CHMP satisfies the statutory requirements of section 87(2)(a) of the *Aboriginal Cultural Heritage Act 2003*, and therefore, no conditions for managing Indigenous cultural heritage are needed for the EA.

4.13.2 Non-indigenous cultural heritage

Searches of the Queensland Heritage Register, Register of the National Estate and Australian Heritage Database revealed that there are no significant non-indigenous historical sites or places registered over the project site. A non-indigenous cultural heritage survey was conducted over the project site in April 2010. The six day field survey conducted in accordance with the significance assessment criteria listed under the provisions of the *Queensland Heritage Act 1992* did not identify any significant historical cultural heritage sites or values. Any sites identified during construction and operations will be managed by the Historical Heritage Management Plan included in Appendix D of the EIS. Consequently, no conditions for managing non-indigenous cultural heritage are needed for the EA.

4.14 Social

A social impact assessment (SIA) of the project was outlined in Volume 1 - Chapter 15 of the EIS and a social impact management plan (SIMP) and housing strategy was provided in Appendix C of the SEIS. The SIA addressed the social and cultural values of the local study area of Collinsville/Scottville and the regional study area of the Whitsunday Region Local Government Area (LGA). Generally, the SIA met the requirements of the TOR. An summary of the potential impacts and proposed mitigation measures, as well as an assessment of the major issues identified during the EIS are outlined below.

4.14.1 Identified social values

In 2006, the resident population of Collinsville/Scottville was about 2,075. In 2010 the Whitsunday Region LGA population was approximately 34,000. The largest population bases in the Whitsunday Region LGA were Bowen (25.1% of the region's total), Proserpine (10.9%), Airlie Beach (10%) and Collinsville (6.0%).

In 2006, the unemployment rate in Collinsville was 6.9%, compared with 4.7 for Queensland. For those people employed in the local study area, mining was the largest industry of employment (32.7%), followed by accommodation and food services, and retail trades (both 9.3%).

In the June quarter of 2010, the Whitsunday Regional LGA had an unemployment rate of 6.9%, compared with 5.7% for Queensland. At the time of the 2006 Census, a large proportion of the adult population was employed in service industries associated with tourism (accommodation and food services). The mining sector accounted for 3.7% of the Region's total workforce, which is more than double the Queensland average (1.7%).

In 2006, Collinsville had the lowest score in relation to the 'Index of Relative Social Disadvantage' (IRSD) of all of the areas within the Whitsunday Regional Council LGA.

Over 40% of occupied dwellings were separate houses and fully owned, with rentals accounting for 24.3% and properties being purchased accounting for 20.6%. The median purchase cost for a house in Collinsville has increased from under \$50,000 in 2000 to \$250,000 in 2008.

The construction phase of the project is expected to employ a peak workforce of approximately 350 workers. During operation, the mine will require a peak workforce of approximately 480 workers by year 25. From years 29 to 30 where the mine is in the rehabilitation stage, the workforce will scale down significantly to 75 workers.

The EIS stated that wherever possible the proponent's contractor will use accommodation in Collinsville. However, an accommodation camp may be constructed on the project site if insufficient accommodation is available.

The EIS stated the transportation arrangements for the workforce will be the responsibility of the selected contractor(s), however it is expected that:

- workers residing in the Collinsville area will have the option of driving to the mine site at the start of each shift or using bus transportation from temporary accommodation
- workers residing in the Whitsunday Region LGA or further afield will travel to Collinsville at the start of each rostered period either by:
 - o driving personal vehicles to Collinsville

- o flying to Proserpine (Whitsunday Coast) or Townsville Airports and then be transported to Collinsville by charter bus
- o all non-resident workers will be transported between provided accommodation and the project site by bus for each shift.

The proponent undertook community and industry consultation to identify social issues from the project. The proponent states that feedback from community consultation was generally supportive of the project and the positive opportunities that it provides for Collinsville (and the Region).

4.14.2 Potential social impacts and mitigation measures

The EIS identified and assessed a range of project related social impacts and opportunities that included:

- temporary increase in the non-resident population in Collinsville during construction (positive and negative impacts)
- increase in the overall population within Collinsville both temporarily during construction and long-term during operation (positive and negative impacts)
- increase in the proportion of males in the 15-65 year old age group during both construction and operation (generally perceived by the community as negative)
- increase in demand for accommodation (positive and negative impacts)
- potential negative implication of increase in demand for accommodation on low-income earners (negative impacts)
- increase in demand for community services and facilities during construction and operation (positive and negative impacts)
- impacts on families while workers are away from home (positive and negative impacts)
- increase in employment opportunities (positive impacts)
- increase in business opportunities (positive impacts).

The proponent states that in response to the issues identified in the SIA, a comprehensive SIMP was developed in consultation with the affected community and other key government and non-government organisations.

The SIMP proposed the following key management strategies for the project:

- an accommodation strategy for the project workforce where contractors will be required to develop an accommodation management plan that addresses the following matters:
 - o the accommodation requirements and accommodation strategy for the construction workforce
 - o projections of future numbers of workers required for construction of the project and the accommodation strategy for housing these workers
 - o arrangements for monthly monitoring and reporting to the proponent on accommodation requirements and any issues arising
- an Integrated Housing Strategy (refer to Appendix C of the SIMP) which details how the project would achieve the proponent's regional approach to meet accommodation supply and demand for the workforce and community
- land compensation package that is designed to manage direct impacts of the project on the landholders and Traditional Owners
- community and industry engagement strategy that includes area-specific communication plans detailing tailored communication and consultation activities
- workforce management strategy that will include the following elements:
 - o accommodation management plan
 - o workforce code of conduct, contracts, employment induction and training
 - o workforce survey (survey at entry and exit to capture key demographic information and housing preferences, membership of local clubs and spending habits)
 - o regional procurement strategy in consultation with the construction to increase the opportunity for regional economic participation and benefits to flow from the project

- o QCoal community grants programs to fund and contribute to community development initiatives
- EIS technical management plans including:
 - o Traffic Management Plan
 - o Emergency Response Plan
 - o EM Plan
 - o CHMP
 - o monitoring and evaluation strategy
 - o participation in regional planning for Collinsville and Bowen.

The EIS identified that if there are insufficient single persons quarters (SPQ) accommodation in Collinsville or Bowen, on-lease SPQ accommodation would be investigated. Any on-lease accommodation would be subject to assessment by an EA amendment application process for an increase in on-site disturbance area and any new or increased capacity of ERAs to be undertaken on-site (e.g. increase in sewage treatment and disposal).

The Department of State Development, Infrastructure and Planning (DSDIP) requested the proponent to further explain the role of the Collinsville Development and Industry Group (DIG) identified in the SIMP, particularly what role the DIG is fulfilling to establish a vision for Collinsville. The proponent updated the SIMP with the following information about the role of the DIG in establishing a vision for Collinsville:

- the Collinsville DIG was formed to connect community, industry and government to address the changing needs of the Collinsville as a result of existing and new developments
- the current membership comprises representatives of the local community; local business; infrastructure and utilities companies; mining companies and contractors; economic development agency; and government
- members of the DIG have formed sub-groups to identify interests and outcomes aligned with four priority areas for Collinsville, determined by community interest
- the four priority areas include: liveability; youth and training; care and safety; economic development
- members of the DIG hold quarterly meetings with the opportunity for additional meetings to further progress the priority areas
- all members of the Collinsville and surrounding communities are also welcome to attend the quarterly meetings

DSDIP were satisfied with the proponent's response.

DSDIP also raised concerns about housing affordability issues in the region particularly in relation to the socio-economic disadvantage of residents not associated with mining in the Collinsville community. In response, the proponent provided the following information:

- the Collinsville DIG and Whitsunday Marketing and Development are working on Collinsville's livability, including housing availability and affordability
- the DIG would produce a report card outlining participating companies' social impact data, including the cumulative impacts on housing requirements in Collinsville
- QCoal's data would be provided at annual community forums and upon request
- the SIMP and Integrated Housing Strategy have been updated to reflect these commitments.

DSDIP was satisfied that the proponent's response adequately addressed the issue.

The Department of Education, Training and Employment (DETE) requested the proponent to prepare a workforce management plan (WMP) even though it was not required by the TOR. A WMP is a new requirement under the social impact assessment process for other resource projects to assess the project's skills needs and outline externally focussed workforce strategies.

The proponent responded by providing an updated SIMP that outlined the occupational breakdown of the construction and operational workforces and included a description of the proponent's intentions for the following:

- recruitment strategy/workforce sourcing
- Indigenous employment
- Indigenous education and training
- employment of women

- cultural awareness
- workers' code of conduct
- workers' health, safety and wellbeing
- general education and training
- apprentices and trainees in the workforce.

DETE was satisfied that the proponent's response adequately addressed the issue.

Whitsunday Regional Council requested further information from the proponent about the Integrated Housing Strategy. Council specifically requested the following information to be included in the strategy:

- an inventory of available accommodation types within varying localities of the project site, not just in Collinsville
- availability of existing accommodation, taking account of the best possible assumption of cumulative accommodation requirements for other existing and potential projects undergoing an EIS
- an analysis of social impacts based on the most likely outcome in the accommodation strategy
- a worst case scenario contingency accommodation strategy that still results in workers being given a choice of accommodation types and locations
- consideration of Whitsunday Regional Council's Community Plan (2011-2021) in regard to developing strong, resilient communities by ensuring the operational workforce associated with mining development resides within the region.

Council also requested an opportunity to review the amended Integrated Housing Strategy.

The proponent contends that consultation with housing providers has identified sufficient existing and approved accommodation to meet the forecasted workforce requirements, as detailed in section 5.5.3 of the Integrated Housing Strategy. Updates to the Integrated Housing Strategy would be completed in conjunction with amendments to the SIMP. The proponent also committed to provide Council with an updated copy of the housing strategy, once available.

Recommendation

The proponent should submit a copy of the amended Integrated Housing Strategy to Whitsunday Regional Council for review, prior to endorsement and implementation.

4.15 Health and safety

The potential impacts of the project on the health and safety of the community was discussed in Chapter 16 of the EIS. Occupational health and safety matters on the worksite are covered by other legislation and are not subject to approval or conditioning under the EP Act. The EIS adequately addressed the health and safety requirements of the TOR. No major health and safety issues were raised during the EIS process.

The community values for public health and safety that may be affected by the project are listed in Table 14 below.

Table 14 - Public health and safety values for the Drake Coal Project (Source: Drake Coal Project EIS)

Aspects	Community public health and safety values
Air environment	Air quality that is conducive to human health and wellbeing Air quality that supports agricultural activities Dust and odour
Noise environment	The qualities of the acoustic environment are those conducive to protecting the amenity of the community. This includes provision of a suitable acoustic environment for individuals to sleep, study or learn or be involved in recreation, including relaxation and conversation.
Disease vectors	Construction activities not leading to increases in local populations or spread of biting insects or pests that are known disease vectors.
Traffic and road safety	Roads supporting traffic volumes appropriate to their design standard.

The EIS identified the main community values for public health and safety that may be affected by the project are air quality and noise. To a lesser extent, there is a potential for the project to cause increases in disease vectors and to directly or indirectly lead to increased road accidents from increased traffic volumes.

The mine would generate air emissions that include total suspended particles, PM₁₀ and PM_{2.5}. Air dispersion modelling has demonstrated that the project will comply with air quality objectives at all sensitive receptors (see section 4.9). The EIS and EM Plan contained mitigation measures to address potential impacts on the local community relating to air emissions.

A noise and vibration assessment was also undertaken for the project. The results indicate that:

- construction noise is not expected to cause adverse impacts at noise sensitive receivers
- predicted operational noise levels are expected to be compliant with day, evening and night-time noise criteria at all sensitive receptors (see section 4.11).

The project site has the potential to provide breeding sites for mosquitoes in water retaining structures, including drainage paths, sediment traps, sediment dams and co-disposal facilities. Co-disposal facilities and sediment dams would be constructed in accordance with the Queensland Health guidelines relating to mosquito control. With these measures in place, the project is not expected to impact on water bodies or drainage in any way that would cause an increase in local populations of biting insects.

An assessment of project traffic volumes indicates that volumes are within the capacity of the existing roads. However, the increased traffic has a minor potential to increase the likelihood of accidents occurring. A dedicated turning lane and signage will be constructed on the Bowen Developmental Road to ensure minimal impact from slowing and turning traffic and mitigate risk close to the project site (see section 4.5). Furthermore, the SIMP contained actions to address road safety.

4.16 Economic

The economic values potentially affected and the potential impacts of the project were outlined in Chapter 17 of the EIS. An economic impact assessment was included in Volume 2B - Appendix Q. The economy section should be read in conjunction with the social chapter in section 4.13 of this report. Section 4.13 describes the baseline social environment including accommodation and housing and outlines the potential social impacts of the project. The management and mitigation of potential socio-economic impacts are described in the Social Impact Management Plan contained in Volume 3 - Appendix C.

4.16.1 Identified economic values

The project is located in the Whitsunday Regional Council local government area (WRC area). The region is characterised by a high incidence of home ownership, lower average household incomes and lower labour force participation. Accommodation and food services, retail trade, agriculture, forestry and fishing, and construction were the most significant industries of employment in 2006. The working population in the WRC area declined between 2001 and 2006, due to a decline in the transport, postal and warehousing, manufacturing, and property and business services sectors. The WRC area recorded a significant competitive advantage for primary industries relative to Queensland and a marginal competitive advantage for tertiary industries.

Over the past nine years to 2009-2010, the size of the labour force has increased by approximately 2.3% per annum to 18,587 persons. The labour force participation rate in the WRC area averaged 67.7%, which is above the state average of 64.8%. The unemployment rate within the WRC area was 6.1% in 2009-2010, which is above the rate in Mackay and Queensland.

As of June 2009, there were 3737 businesses in the WRC area with the largest number of businesses being in agriculture, followed by forestry and fishing, construction and rental, hiring and real estate services.

The most significant agricultural commodities in 2005-2006 in terms of value were:

- tomatoes: \$74.38 million, accounting for 51.2% of Queensland production value
- capsicums: \$63.53 million, accounting for 45.8% of Queensland production value
- sugarcane: \$57.55 million, accounting for 5.9% of Queensland production value
- French and runner beans: \$30.19 million, accounting for 48.8% of Queensland production value.

In the Whitsunday RC area in the June quarter 2010, the availability of accommodation and housing was:

- 51 hotels, motels and serviced apartments, with a total of 3043 rooms
- 16 caravan parks, with a total of 1534 sites

- 168 holiday flats, units and houses, with a total of 671 beds
- 9 hostels, with a total of 1332 beds.

Between the March quarter of 2005 and the June quarter of 2010, the average occupancy rate in the WRC area was 57.3% for hotels, motels and serviced apartments, 49% for caravan sites, 60.8% for holiday flats, units and houses, and 62.3% for hostel beds. Compared to the Queensland average, occupancy rates in the WRC area were generally lower for hotels, motels and serviced apartments, caravan parks, and holiday flats, units and houses, and generally higher for hostels.

Between 2001-2002 and 2009-2010, there were 6039 house sales; 3628 unit and townhouse sales; 205 commercial sales; 105 industrial sales; and 3695 vacant land sales. During that period, the median sale price of houses, commercial property and vacant land in the WRC area was generally below the price of the neighbouring Mackay statistical division. During that period, the median sale price of units and townhouses, and industrial properties in the WRC area were generally above the price in the Mackay statistical division.

Between the March quarter 2008 and the September quarter 2010, median weekly rents for two bedroom units in the WRC area were consistently below the Queensland median for the same period. Median weekly rents for three bedroom houses were above the Queensland median for the same period. Median weekly rents for three bedroom houses in the WRC area were more in line with the Queensland median for the same period.

4.16.2 Potential economic impacts and proposed mitigation measures

Based on current indicative coal prices, the annual value of coal exports is likely to range from \$540 million to \$1.2 billion, depending on the export mix of coking and thermal coal. This level of coal export would result in payment of between \$38 million and \$100 million per annum in state royalties and approximately \$26 million per annum in port and rail charges.

The pre-construction, procurement and construction phase of the project is anticipated to have a total cost of about \$265 million, with the majority of expenditure expected to occur during construction. Project operating costs are expected to be about \$229 million during the first year of operation and would peak at about \$460 million per year by the fourth year of operation and remain steady at that level up to and including the 26th year of operation. Decommissioning costs are expected to occur between the 27th and 30th years of operation and total \$27 million.

The most significant economic impacts of the project's pre-construction, procurement and construction expenditure would occur in the third and final year, and would include:

- \$390.78 million of output/consumption beneficial impacts, including \$47.81 million in the WRC area
- \$101.65 million of household income beneficial impacts, including \$11.66 million in the WRC area
- 1582 additional full-time equivalent positions (FTEs), including 182 in the WRC area (beneficial and negative impacts)
- \$162.48 million in value added beneficial impacts, including \$22.53 million in the WRC area.

The most significant economic impacts of the project's operating expenditure would peak in the fourth year and continue until the 26th and final year, and would include:

- \$1,058.24 million of output/consumption beneficial impacts, including \$568.56 million in the WRC area
- \$213.38 million of household income beneficial impacts, including \$117.01 million in the WRC area
- 2,856 additional FTEs, including 1,598 in the WRC area (beneficial and negative impacts)
- \$531.78 million in value added beneficial impacts, including \$296.34 million in the WRC area.

All decommissioning impacts would occur in-region and the most significant economic impacts of the project's decommissioning expenditure would peak in the 27th year, and would include:

- \$28.05 million of output/consumption beneficial impacts, including \$12.00 million direct and \$16.05 million indirect beneficial impacts
- \$4.13 million of household income beneficial impacts, including \$1.38 million direct and \$2.76 million indirect beneficial impacts
- 98 additional FTEs, including 36 direct and 62 indirect (beneficial and negative impacts)
- \$10.78 million in value added beneficial impacts, including \$2.91 million direct and \$7.86 million indirect beneficial impacts.

The indicative beef cattle production value of the site is estimated to be \$1.22 million per annum. The loss of

ecological communities associated with clearing 891ha of woodland habitat for the project is conservatively estimated to generate \$3 million per annum of non-market economic disbenefits.

Local inflation is likely to impact labour costs and housing and accommodation the most, followed by groceries and transport costs to a lesser extent.

Cumulative impacts as a result of other mines and supporting infrastructure projects in the region would result in an increased demand for local services and accommodation.

Mitigation measures proposed by the proponent to be implemented during the construction, operation and decommissioning phases of the project include:

- establishing workers accommodation and using non-resident workforce to mitigate local inflationary pressure
- participation in construction and operation by trainees, Indigenous workers, local suppliers and contractors
- recruiting 10% or more of labour hours from apprentices and trainees
- encouraging and providing opportunities for up-skilling of the workforce
- preparing a local industry participation plan according to the Queensland government's Local Industry Policy

The Department of Communities, Child Safety and Disability Services raised concerns about inflation impacts on low income workers. In addition to the above-mentioned mitigation measures to combat inflation pressure, the proponent also committed to:

- promoting property development by informing accommodation developers of forecast project requirements to increase housing supply and assist in managing demand and associated increase in housing costs
- requiring employment contractors to ensure employment opportunities are available to local people and notifying employment and training organisations of project related opportunities

The Department of Communities, Child Safety and Disability Services was satisfied with the proponent's response.

4.17 Hazard and risk

A qualitative risk assessment of potential hazards to the community, including actions for mitigating or reducing the level of risk during the construction and operation phases of the project was discussed in Chapter 18 of the EIS. A hazard and risk assessment of the site water management system was included in Volume 3, Appendix B - Water Management Plan. The EIS adequately addressed the hazard and risk requirements of the TOR.

4.17.1 Potential hazard and risk impacts

The EIS used the risk matrix shown in Figure 5 to determine the likelihood and consequence of each identified project hazard. The definition of the likelihood and consequence of a hazard is shown in Figure 6.

Figure 5 - Risk and significance matrix (Source: Drake Coal Project EIS)

Likelihood	Consequence				
	Catastrophic (5)	Major (4)	Moderate (3)	Minor (2)	Insignificant (1)
Almost certain (5)	Extreme	Extreme	Extreme	High	Medium
Likely (4)	Extreme	Extreme	High	Medium	Medium
Possible (3)	Extreme	High	High	Medium	Low
Unlikely (2)	High	High	Medium	Low	Low
Rare (1)	Medium	Medium	Low	Low	Low

Figure 6 - Consequence and likelihood definitions

Risk Level	Delegate	Description
Extreme	General Managers	Eliminate or reduce risk through additional control measures along with a documented action plan.
High	Senior Management	Risk must be eliminated or reduced. Requires a documented action plan.
Medium	Employee	Acceptable with formal review. Documented action plans required.
Low	Employee	Acceptable with review. Rationale must be documented.

Many hazards were assessed to have a low risk. However, the following project hazards were assessed as posing a medium or high risk to people and/or the environment:

- project related traffic and pedestrian accidents on the Bowen Developmental Road, or other public roads, including through the Collinsville township (Likelihood: Possible; Consequence: Major; Overall risk: High)
- persons accessing the mine site without authorisation (Likelihood: Rare; Consequence: Catastrophic; Overall risk: High)
- spill or leak from diesel storage tank resulting in surface/groundwater contamination (Likelihood: Unlikely; Consequence: Moderate; Overall risk: Medium)
- snake bite resulting in loss of consciousness (Likelihood: Rare; Consequence: Major; Overall risk: Medium)
- bushfire at the project site resulting in the destruction of property and vegetation and risk of death or injury (Likelihood: Unlikely; Consequence: Moderate; Overall Risk: Medium)
- storm or flood on-site resulting in injury or drowning (Likelihood: Unlikely; Consequence: Moderate; Overall risk: Medium)
- lightning strike during a storm event (Likelihood: Rare; Consequence: Catastrophic; Overall risk: Medium)
- heat wave resulting in heat stress or death in vulnerable persons (Likelihood: Possible; Consequence: High; Overall risk: High)
- coal seam or product stockpile fire on the mining lease releasing airborne contaminants off-site (Likelihood: Unlikely; Consequence: Moderate; Overall risk: Medium).

4.17.2 Proposed hazard and risk mitigation measures

The following mitigation measures are proposed to reduce the risk of the medium and high risk hazards identified above:

- mine construction and operation generated traffic will operate mostly during daylight hours
- a single designated heavy vehicle travel route through Collinsville
- drivers trained in safe driving
- traffic management plans would be developed for oversize loads during the construction phase
- the Bowen Developmental Road intersection at the mine site would be upgraded with turning lanes and signs
- first aid kits would be added to all project related vehicles
- trips would be avoided along school routes during school bus timetables (7.15am to 8.30am and 2.30pm to 3.30pm)
- areas with a high risk of unauthorised public access would be fenced off
- hydrocarbons and chemicals would be appropriately stored and banded to prevent any off-site release of contaminants
- use of appropriate personal protection equipment when working in vegetated areas to avoid snake bites
- maintain fire breaks and educate staff about bushfire prevention
- infrastructure adequately banded to limit flooding and appropriate site evacuation procedures in place
- cessation of certain activities during lightning storms in accordance with emergency response plan

- staff education and use of personal protection equipment to prevent heat stroke
- educate staff about the management of coal seam surface exposure and include fire fighting equipment on all earthmoving equipment.

The majority of the above hazards would be reduced to a residual low risk with the implementation of the above mitigation measures. However, the following three risks would retain a residual medium or high risk due to the potential consequence of severe injury or loss of life should an accident occur:

- project related traffic and pedestrian accidents on the Bowen Developmental Road, or other public roads, including through the Collinsville township (Likelihood: Unlikely; Consequence: Major; Residual risk: High)
- persons accessing the mine site without authorisation (Likelihood: Rare; Consequence: Catastrophic; Residual risk: Medium)
- lightning strike during a storm event (Likelihood: Rare; Consequence: Catastrophic; Residual Risk: Medium)

The residual medium risks of persons accessing the mine site and lightning strike cannot be further reduced because even though the likelihood of occurrence has been reduced to rare, the potential consequences of these hazards remain catastrophic (e.g. the worst-case would result in fatalities).

In response to the residual high risk of project related traffic accidents, the proponent proposes to develop a risk management plan prior to activities commencing on-site. The plan would include actions for vehicle accident response in conjunction with emergency services to ensure the quickest possible response time to an accident, should one occur. The quicker the response time, the greater the likelihood of injuries being successfully treated and lives being saved. The mitigation measures proposed by the proponent, as well as the additional actions proposed above, are considered suitable for managing the residual risks of the project

Conditions to ensure that appropriate risk management measures are implemented for the project would be included in the project EA.

The Queensland Ambulance Service (QAS) identified a number of other hazard management actions that need to be implemented by the proponent, as follows:

Recommendation

The proponent should liaise with Queensland Ambulance Service (QAS), Collinsville, to establish emergency medical access points and develop an access action plan to facilitate emergency response to the site and that these plans and access points are regularly reviewed throughout the life of the project.

Recommendation:

The proponent should liaise with the QAS to conduct a practice exercise at least once per year with the Drake Coal mine rescue service to test response capability.

The Water Management Plan in Volume 3 of the EIS also identified the overflow of the initial co-disposal dam as a potential hazard. Concerns were raised by a number of government, non-government and public submitters that the initial co-disposal dam was too close to the Bowen River, thereby creating an unnecessary risk of failure and associated consequences to those people who use the Bowen River for recreational pursuits and to the downstream environment. In response, the proponent relocated the proposed location of the co-disposal dam further away from the Bowen River (see section 4.6.2). The new location is well above the 1-in-5000-year ARI flood level of the Bowen River, which would significantly reduce the potential for structural failure during a significant rainfall event. In any case, the initial co-disposal dam has been identified as a regulated structure and as such would require specific management measures to be implemented, including:

- contingency and emergency action plans outlining operating procedures designed to avoid and/or minimise environmental impacts, including threats to human life resulting from any overtopping or loss of structural integrity of regulated structures
- annual inspections by a suitably qualified and experienced person, including preparation of an annual inspection report containing details of the assessment and recommended maintenance actions to ensure the integrity of the regulated structure, if required.

Consequently, EHP has determined that the initial co-disposal dam would be adequately managed by the implementation of the management and maintenance measures for regulated structures to be included as conditions in the project EA.

4.18 Matters of National Environmental Significance

Matters of national environmental significance (MNES) are discussed in Chapter 19 of the environmental impact statement (EIS) and adequately addressed the requirements of the TOR. An assessment of MNES is outlined below.

The project was referred to the Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC) on 21 April 2010. On 4 June 2010 the Commonwealth Minister for SEWPAC determined the project to be a controlled action pursuant to section 75 of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The controlling provisions are Sections 18 and 18A (listed threatened species and communities). The State's EIS process has been accredited for the assessment under Part 8 of the EPBC Act in accordance with the Bilateral Agreement between the Commonwealth of Australia and the State of Queensland (2004). However, the project will require a separate Commonwealth approval under Part 9 of the EPBC Act.

Since the original database search and field survey in 2007 that was used to prepare the project referral for SEWPAC, there have been two additional flora and fauna surveys completed, in 2010 and 2012. The additional surveys included targeted surveys for listed flora and fauna and have provided detailed information on species and communities that exist, or are likely to exist, within the project area. It should be noted that migratory species was not identified by SEWPAC as a controlling provision in the original referral for the project. However, the subsequent flora and fauna surveys conducted as part of the EIS process in 2010 and 2012 identified a number of migratory species occurring on-site. Furthermore, a number of other migratory species were assessed to be likely to occur, or may occur, based on a likelihood of occurrence assessment undertaken by the proponent. Consequently, migratory species is now a MNES. The identification of migratory species and an assessment of the impacts of the project on migratory species are discussed in the following sections.

In summary, the surveys found that the project site supports a range of flora and fauna including a number of listed, rare and threatened species which are described in the following section. The ground layer is typically highly disturbed and dominated by buffel grass with a sparse and degraded understorey. The majority of the project footprint in degraded to highly degraded condition due to historical clearing for agriculture and associated development. The areas of vegetation that will be retained within the project footprint range from highly degraded to good condition.

The identification of MNES and an assessment of the potential impacts of the project on EPBC Act listed threatened species and communities are included below.

4.18.1 Identified MNES

The EIS reported that the following listed species and threatened ecological communities (TECs) were identified during the 2007, 2010 and 2012 field surveys:

- **Brigalow** (*Acacia harpophylla* **dominant and co-dominant**): TEC listed as endangered under the EPBC Act
- **Natural grasslands of the Queensland central highlands and the northern Fitzroy Basin**: TEC listed as endangered under the EPBC Act
- **Blue-grass** (*Dichanthium setosum*): species listed as vulnerable under the EPBC Act
- **Squatter pigeon (southern)** (*Geophaps scripta scripta*): species listed as vulnerable under the EPBC Act
- **Ornamental snake** (*Denisonia maculata*): species listed as vulnerable under the EPBC Act
- **Rainbow bee-eater** (*Merops ornatus*): species listed as a migratory terrestrial species under the EPBC Act

A likelihood of occurrence assessment was undertaken that takes account of the species' known distribution and habitat requirements. The assessment involved reviewing known species information such as distribution, habitat requirements and previous records against project site conditions and habitats identified during field surveys to determine the potential for the species to occur on the project site. The assessment categories included 'likely to occur' and 'may occur'. Species assessed as likely to occur were determined by the species being recorded in the region based on desktop searches and suitable habitat identified by a suitably experienced ecologist during ground-truthing at the project site. Species assessed as may occur have not been recorded in the region based on desktop searches, although species' distribution incorporates the project site and potentially suitable habitat was identified by a suitably experienced ecologist during ground-truthing at the project site. The assessment found that two additional flora species and four migratory and/or marine species are likely to occur, and one flora species and five fauna species may occur in the project area as follows:

Flora (found to be likely to occur):

- **black ironbox** (*Eucalyptus raveretiana*): species listed as vulnerable under the EPBC Act

- **king blue-grass** (*Dichanthium queenslandicum*): species listed as vulnerable under the EPBC Act

Migratory wetland species (found to be likely to occur):

- **great egret** (*Ardea alba*)
- **cattle egret** (*Ardea ibis*)

Migratory terrestrial species (found to be likely to occur):

- **white-bellied sea-eagle** (*Haliaeetus leucogaster*)

Migratory marine species (found to be likely to occur):

- **salt-water crocodile** (*Crocodylus porosus*).

Flora (may occur):

- **quassia** (*Quassia bidwillii*): species listed as vulnerable under the EPBC Act.

Fauna (may occur):

- **red goshawk** (*Erythrotriorchis radiatus*): species listed as vulnerable under the EPBC Act
- **black-throated finch** (*Poephila cincta cincta*): species listed as endangered under the EPBC Act
- **northern quoll** (*Dasyurus hallucatus*): species listed as endangered under the EPBC Act
- **yakka skink** (*Egernia rugosa*): species listed as vulnerable under the EPBC Act
- **brigalow scaly-foot** (*Paradelma orientalis*): species listed as vulnerable under the EPBC Act
- **koala** (*Phascolarctos cinereus*): species listed as vulnerable under the EPBC Act. However, the koala was not a listed species under the EPBC Act at the time of the referral decision about the likely significance of impact of the project on threatened species and communities. Therefore, SEWPAC has determined that an assessment of the impacts of the project on the koala is not required.

4.18.2 Impacts of the project on MNES

The project area is 9196ha, of which 740ha is proposed to be cleared. Project infrastructure has been located so as to avoid or limit impacts to native vegetation as far as practical. For example, the out-of-pit overburden dumps would be positioned to avoid impacting on conservation significant vegetation and important habitats. Proposed clearing has also been staged to occur over a period of years, with parallel efforts to restore disturbed habitats, where possible, and to improve degraded habitats through regeneration and condition improvement.

The Commonwealth's Significant Impact Guidelines 1.1 (DEWHA, 2009) were used to assess the significance of impact on the MNES. The assessment in the EIS concluded that the project would not have a significant impact on any of the MNES provided that the proposed mitigation measures were successfully implemented. Consequently, there would be no residual adverse impacts that would need to be offset under the EPBC Act Environmental Offset Policy (EOP). Nevertheless, the proponent proposes to offset impacts on the brigalow TEC and ornamental snake and squatter pigeon habitats under Queensland legislation.

The potential impacts of the project on MNES and proposed mitigation strategies identified in the EIS include:

Brigalow (*Acacia harpophylla* dominant and co-dominant): A total of 8.9ha of brigalow TEC would be cleared and 22.4ha would be retained on-site. The cleared brigalow would be offset under Queensland legislation as outlined in the biodiversity offset strategy (BOS), discussed in section 4.10.3 of this report. The remaining brigalow would be improved through restoration, weed management, management of cattle and rehabilitation.

Natural grasslands of the Queensland central highlands and the northern Fitzroy Basin, incorporating blue-grass (*Dicanthium setosum*) and **king blue-grass** (*Dicanthium queenslandicum*): While the EIS that was released for public notification indicated that a total of 9.3ha of natural grasslands of the Queensland central highlands and the northern Fitzroy Basin containing blue-grass and likely to contain king blue-grass would be cleared for the project, a revision of the mine plan presented in the SEIS altered the footprint and location of key project infrastructure so that the total area of natural grasslands likely to be impacted was reduced to 2.3ha. The reduced area was assessed as being unlikely to have a significant impact on the natural grasslands community and offsets are not proposed. A total of 146ha of Natural grasslands would be retained on-site. The remaining natural grasslands would be improved through restoration, weed management, management of cattle and rehabilitation.

Black ironbox (*Eucalyptus ravertiana*): Black ironbox was not recorded in the project area during field surveys and no black ironbox is proposed to be directly impacted by the project. However, black ironbox was assessed as likely to occur on the project site and its habitat values would be preserved by retaining 57ha of suitable habitat adjacent

to the Bowen River.

Quassia (*Quassia bidwillii*): Quassia was not recorded in the project area during field surveys and no quassia would be directly impacted by the project. However, quassia may occur on the project site and its habitat values will be preserved by retaining 57ha of suitable habitat adjacent to the Bowen River.

Ornamental Snake (*Denisonia maculata*): The ornamental snake was identified during field surveys and a total of 31.3ha of brigalow on the project site provides habitat suitable for it. As stated above, 8.9ha of brigalow would be cleared on-site and 22.4ha would be retained and improved. The impacts on the brigalow habitat would be offset as discussed in section 4.18.3 of this report. Consequently, additional specific offsets under the EPBC Act EOP for the loss of 8.9ha of suitable ornamental snake habitat are not proposed. Similar suitable habitat for the ornamental snake has been identified in nearby areas and there is no likelihood of significant impact of the project on habitat fragmentation, connectivity and condition for the ornamental snake. The most likely impact to the ornamental snake is injury or mortality by clearing during the construction phase. Mitigation measures would include: covering open trenches or installing fauna ramps to provide a means of escape; checking work areas prior to commencement each day for trapped fauna; employee education about environmental responsibilities; and removing any dead fauna found on-site to mitigate a potential increase in the occurrence of predators such as raptors.

Yakka skink (*Egernia rugosa*) and **Brigalow scaly-foot** (*Paradelma orientalis*): The yakka skink and brigalow scaly foot may occur on the project site within 3976.5ha of suitable habitat consisting of *E. crebra* woodland, *E. brownii* woodland and mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. The most likely impact to these reptiles is injury or mortality by vegetation clearing during the construction phase. Similar mitigation measures proposed for the ornamental snake above would be implemented to minimise any impact. No offsets are proposed for these two species as they were not identified during field surveys nor assessed as likely to occur on-site.

Red goshawk (*Erythrorhynchus radiatus*): While not recorded on the site during field surveys, the assessment found that the red goshawk may occur in 57ha of suitable Eucalypt and Melaleuca woodland habitat along the northern banks of the Bowen River. This habitat would not be impacted by the project and no offsets are considered necessary. Furthermore, offsets proposed under Queensland legislation for the loss of endangered and of concern REs and listed species are expected to directly benefit red goshawk habitat.

Black-throated finch (*Poephila cincta cincta*): While not recorded during field surveys, the assessment found that the black-throated finch may occur in 3976.5ha of suitable *E. crebra* woodland, *E. brownii* woodland and mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. Potential impacts were not assessed as significant due to the broad scale of suitable habitats available for the black-throated finch and no offsets are considered necessary. Furthermore, offsets proposed under Queensland legislation are expected to directly benefit black-throated finch habitat.

Northern quoll (*Dasyurus hallucatus*): While not recorded during field surveys, the northern quoll may occur in 3976.5ha of suitable foraging habitats on-site, including *E. crebra* woodland, *E. brownii* woodland, mixed eucalypts and corymbia woodland and mixed eucalypt and melaleuca woodland fringing watercourses and alluvial plains vegetation communities. However, there are no rocky outcrops and few dead logs for den sites present on the project site. Therefore, if present, it is expected that the northern quoll would use the project site as additional foraging habitat, rather than for shelter and breeding. Consequently, potential impacts were not assessed as significant and no offsets are proposed.

Squatter pigeon (southern) (*Geophaps scripta scripta*): A total of 176.5ha of woodland communities (REs 11.3.30/11.3.9/11.3.7/11.3.4) containing suitable habitat for the squatter pigeon have been identified on-site. The squatter pigeon is known to use a range of habitats including grasslands, grassy woodlands and open forests, particularly those that are in close proximity to water. This can include vegetation that is remnant, non-remnant, non-native and in good to highly degraded condition. The squatter pigeon also occurs in grassland habitats and other woodland REs that are present in the sub-region, but are not present on the project site. Therefore, suitable habitat for the squatter pigeon is not limited by condition and potentially suitable habitat for the species in close proximity to water sources remains widespread and abundant in the region. Impacts on squatter pigeon habitat would be offset as discussed in section 4.18.3 of this report. A total of 3248.4ha of remnant and woodland vegetation on-site suitable as habitat for the squatter pigeon will be retained and improved through the management of cattle and weed and fire management. Active management of non-impact areas of the site for biodiversity during project operation will improve the condition of currently degraded habitats, providing direct benefit for the squatter pigeon.

Migratory wetland, migratory terrestrial and migratory marine species: The field surveys identified one migratory terrestrial species (**rainbow bee-eater**) on the project site. An additional migratory terrestrial species (**white-bellied sea-eagle**), two migratory wetland species (**great egret** and **cattle egret**) and one migratory marine species (**salt-water crocodile**) were considered likely to occur on the project site based on species distribution and habitat types present on-site. The project proposal was assessed as being unlikely to have a significant impact on

these bird species because they are mostly transient and would only use the project area sporadically during migration movements. Potential habitat for some of these species may exist on-site, particularly during the wet season. However, the site is unlikely to provide core habitat for feeding, breeding or roosting as there are no wetlands or marine environments on the project site. There is no evidence to suggest that the project site supports an important population of these migratory bird species. Consequently, no offsets are proposed.

The salt-water crocodile is likely to occur in the Bowen River which borders the southern boundary of the project site. The nearest project infrastructure (Central Pit 3) would be located about 400m away from the high bank of the Bowen River. Subject to the implementation of appropriate stormwater management and erosion and sediment control measures to minimise any changes to off-site water quality, the proponent assessed that there is no likelihood of significant impact of the project on the salt-water crocodile. Consequently, no offsets are proposed.

SEWPAC comments on the EIS

SEWPAC reviewed the EIS and identified that additional information was required regarding the following issues:

- cumulative impacts resulting from other planned or potential mining developments in the region, including an analysis of regional impacts on the squatter pigeon and the brigalow and natural grasslands TECs, including the quality, fragmentation and connectivity between areas of suitable habitat or ecological communities, and
- residual impacts to squatter pigeon habitat, brigalow and natural grasslands TECs to determine offset requirements.

In response, the proponent provided information about the impacts of the project at a regional scale, particularly with regard to cumulative impacts on brigalow, natural grasslands and the squatter pigeon. The proponent also provided information about the residual impacts on the squatter pigeon, brigalow and natural grassland communities. SEWPAC considered that the information provided was largely adequate with regard to the assessment of impacts on MNES associated with the development and operation of the project, with the exception of how offsets were calculated, where further clarification was requested (see section 4.18.3).

4.18.3 Offsets for MNES

The EIS states that the EPBC Act EOP is not relevant to the Drake Coal Project due to the impacts of MNES being below those considered as significant when assessed against the detailed significance criteria (DEWHA 2009). Consequently, the EIS states that there is no likelihood of significant residual impact on MNES, and therefore, no offsets are proposed under the EPBC Act EOP.

However, SEWPAC decided that the impacts on MNES would be significant and requested the proponent to run the residual impact on MNES through the EPBC Act offsets assessment guide impact calculator. SEWPAC also requested the proponent to compare the offsets generated by the impact calculator with the relevant offsets proposed under Queensland legislation to ensure there are no additional offsets required under the EPBC Act. Table 14 provides a summary of the proponent's assessment for the brigalow (*Acacia harpophylla*) TEC, the blue-grass (*Dicanthium setosum*) species, and the ornamental snake and squatter pigeon habitat values. It should be noted from Table 15 below that 2.8ha of RE11.9.10 that comprises the brigalow tree species, but is not part of the 8.9ha of the TEC, is proposed to be offset under Queensland legislation. For the purposes of achieving both state and Commonwealth policy requirements, the total impact to brigalow has been calculated to be 11.7ha.

Table 15 – Outputs from the EPBC Act offsets assessment guide impact calculator

EPBC Act TEC or listed species	Approximate total impact	Approximate quantum of impact *	Proposed offset under Queensland legislation ** and % of impact offset according to Commonwealth impact calculator
Brigalow (<i>Acacia harpophylla</i>) dominant and co-dominant which also provides habitat for the ornamental snake (<i>Denisonia maculata</i>)	11.7ha	7.02ha	52ha (101%)
Blue-grass (<i>Dicanthium setosum</i>)	2.3ha	1.84ha	5ha (105%)
Squatter pigeon (Southern) (<i>Geophaps scripta scripta</i>)	181.8ha	109.08ha	573ha (100%)

Table notes: * A proportion of the total impact area taking into account the existing habitat quality of impacted vegetation communities

** An offset area multiplier based on spatial and temporal risk factors used to calculate offsets that achieve a net biodiversity benefit

The calculations presented in Table 6 show that the offsets proposed under Queensland legislation would directly achieve the objective under the EPBC Act of providing a net biodiversity benefit for each MNES value. Consequently, the proponent concluded that any offsets required for residual impacts on MNES under the EPBC Act would be achieved by the offsets proposed under Queensland legislation. SEWPAC considered the additional information provided by the proponent and concluded that the offsets proposed under Queensland legislation are adequate to meet the Commonwealth's requirements and no additional offsets would be necessary under the EPBC Act.

SEWPAC would require the proponent to implement an Offsets Area Management Plan and this requirement would be included as a condition of the approval under the EPBC Act. SEWPAC also requires some further clarification about the commitments made in the Biodiversity Offset Strategy (BOS).

Recommendations

The proponent should amend the BOS to address the following matters:

- *how measurable gains in future vegetation quality proposed in Figures 5 and 6 of the BOS could be achieved to fulfil the EPBC Act requirements for direct offsets to provide a measurable conservation gain*
- *an explanation of how and when the management actions listed in Part 8 of the BOS would be implemented*
- *how the condition of the vegetation to be impacted on the project site compared to the condition of the vegetation in the proposed offset areas would influence the length of time of active management of the offset areas.*

The proponent should submit a revised BOS to SEWPAC to assist the Commonwealth Minister with making a decision about the referral under the EPBC Act.

4.18.4 Feasible project alternatives

The matters prescribed in section 9 of the *Environmental Protection Regulation 2009* for this EIS assessment report are outlined in section 3.4.5 of this report and require, '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.

Feasible project alternatives were discussed in Volume 1 - Chapter 2 of the EIS. The EIS adequately described the feasible alternatives to the project and selected the preferred options based on social, economic, environmental and geological considerations. The majority of the preferred project alternatives would result in similar, or less impacts on MNES, compared to alternatives that were not selected. The only exception is the unlikely event that on-site accommodation facilities would be required for the project. If proposed, these facilities would require assessment by a separate EA amendment application process and, depending on their proposed location in relation to MNES, may also require referral to SEWPAC for a controlled action decision under the EPBC Act.

Feasible alternatives do not include an alternative location for the mine due to geological and tenure constraints.

Feasible alternatives assessed for the project include:

A different annual coal production rate: A different annual coal production rate would result in the same amount of impact in terms of the overall disturbance area of mining pits and waste rock emplacements. There may be some differences in the footprint of the mine industrial area (MIA) to cater for a larger coal handling and processing plant (CHPP), workshop areas and site offices to cater for a larger workforce. However, the differences would be expected to have a negligible effect on the impacts of the project on MNES because the MIA is not located near any TECs listed under the EPBC Act. However, the distribution of the impacts over time would be different. A lower annual coal production rate would result in a lower rate of impact but over a longer period of time. This may reduce the intensity of certain project related impacts such as air and noise emissions and project related traffic. A higher annual coal production rate would result in a greater rate of impact over a shorter period of time. Impact mitigation measures would have to be commensurate with any changes in annual coal production rates. If appropriate mitigation measures were implemented, overall impacts on MNES would be expected to be similar.

During project planning the most efficient coal production rate was selected based on the existing geological structures, depth and location of coal seams, infrastructure constraints for haulage, processing and transport and indicative customer requirements for product coal from the project.

Alternative mining methods: Both longwall and bord and pillar underground mining and open-cut mining methods were considered for the project. Open-cut mining would have a larger environmental footprint than underground mining, due to the need for out-of-pit waste rock emplacements and additional surface infrastructure such as haul roads and surface water management infrastructure. Therefore, underground mining may result in less immediate 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.

If underground mining was selected, geological conditions of the site would require a combination of longwall mining and bord and pillar mining methods. However, bord and pillar methods typically achieve only 50% of coal extraction from the working section, which is substantially less than open-cut mining methods, and would potentially make the project economically unviable. Furthermore, the selection of mining method is also dependent on the depth of coal deposit. Targeted coal seams occur at depths between 20m and 140m below ground level and vary between 0.3m and 15m in thickness. Underground mining methods typically target seams between 2m and 5m thick and require a minimum depth of about 50m below ground level, which would sterilise a significant portion of the shallower and thicker targeted coal resource. Consequently, open-cut mining was chosen as the preferred mining method because it has significantly higher resource recovery rates than underground mining, as well as fewer technical and engineering challenges to overcome, based on the known geological conditions of the site.

Alternative overburden removal techniques: The two prominent techniques of overburden removal are by dragline or by truck and shovel. However, the disturbance areas of both techniques would be very similar and the impacts on MNES would also be expected to be similar. Truck and shovel overburden removal was chosen for the Drake Coal Project due to overburden properties and depth, pit sizes and layout, as well as available space and overall cost effectiveness.

Alternative location of water storage facilities: The water collected in mining pits during operations would be stored at several different locations over the life of the mine as mining in the pits progresses. The chosen locations are constrained by issues such as: cost of regularly moving sediment basins versus the cost of longer channels and greater pumping distances; available space; and the project water demands. The water management infrastructure has been designed to capture all potentially contaminated water for treatment, while allowing flexibility to transfer water from pits to co-disposal facilities for treatment and storage.

During the assessment of public submissions on the EIS, the proponent relocated the proposed location of the sediment basins for West Pits 1 and 2 to areas not in remnant vegetation. This would result in a slightly smaller disturbance footprint on MNES, including the natural grasslands TEC, blue-grass and the potentially occurring king blue-grass.

Alternative location of accommodation facilities during the construction and operation phases: The accommodation strategy for the project is to provide the workforce with choice with respect to housing options.

Based on discussions with accommodation providers, the construction workforce would be accommodated in either existing or purpose-built single persons quarters (SPQ) in Collinsville or Bowen.

The proponent expects that the operations workforce would be accommodated in a number of areas including Collinsville (12-15%), the greater Whitsunday Region (30-40%) and the remainder living further abroad. These workers who chose to live locally would make their own accommodation arrangements, most likely by renting or buying a house or unit. Workers who chose to live in the greater Whitsunday Region or further abroad would reside in the SPQ only when on roster.

With regard to off-lease accommodation, there are an estimated 500 rooms potentially available in accommodation facilities in Collinsville, including SPQ, hotels, motels and other temporary accommodation. A number of other property developers have also recently obtained development approvals for additional temporary accommodation in Collinsville. The appointed construction contractor would be responsible for arranging accommodation for the construction workforce. Any new accommodation facilities would require a separate approval from the Whitsunday Regional Council.

In the unlikely event that there was insufficient SPQ accommodation available in Collinsville or Bowen, additional SPQ may be built on-lease within the project site. On-lease accommodation may have an additional impact on MNES. However, depending on the proposed location of the on-lease accommodation and the potential impacts on MNES, a referral to SEWPAC may be required for a determination about whether the proposed action would be a controlled action and require approval under the EPBC Act.

4.18.5 Commonwealth Independent Expert Scientific Committee

In February 2012, Queensland signed the National Partnership Agreement on Coal Seam Gas and Large Mining Development (NPA) (available to download at: www.ehp.qld.gov.au/management/impact-assessment/pdf/partnership-agreement.pdf). The purpose of this agreement was to create a more consistent national approach to strengthen the regulation of coal seam gas (CSG) and large coal mining development by ensuring that future decisions are informed by substantially improved science and independent expert advice.

The agreement does this by establishing an Independent Expert Scientific Committee (IESC) which gives the Queensland and Australian governments expert scientific advice on these significant CSG and large coal mining development proposals likely to have a significant effect on water resources. Under the NPA, while the Commonwealth Minister could take this advice into consideration when making a final decision, the Minister did not

have the power to impose conditions directly relating to impacts on a water resource itself.

The EPBC Act was recently amended to include water resources as a MNES in relation to coal seam gas and large coal mining development. The water trigger allows the impacts of proposed coal seam gas and large coal mining developments on water resources to be comprehensively assessed at a national level. The water trigger also allows the Minister to set appropriate conditions as part of the project approval to ensure that any significant impacts on a water resource are acceptable. The amendment commenced on 22 June 2013.

The Drake Coal project is covered by the transitional provisions of the *Environment Protection and Biodiversity Conservation Amendment Act 2013* (EPBC Amendment Act). Under the transitional provisions of the EPBC Amendment Act the Environment Minister must consider whether water resources (sections 24D and 24E of the EPBC Act) are controlling provisions for the project. Should the Minister determine that the water trigger applies to the project, any EPBC Act approval decision would also need to consider an assessment of water resources.

With regard to the involvement of the IESC under the Bilateral Agreement, the EIS for the Drake Coal Project was released for public comment prior to the development of a Queensland protocol under the NPA. Consequently, SEWPAC (instead of EHP) referred the project to the IESC on 29 September 2012 and the IESC provided advice on 20 December 2012. When considering the IESC advice EHP sought assistance both internally within EHP and from other government departments, including DNRM and the Department of Science, Information Technology, Innovation and the Arts. Subsequently, the IESC advice has been taken into account as follows:

Points 1 to 3 of the IESC advice (Surface water-groundwater interaction and cumulative impacts)

1. "The Committee is concerned about potential cumulative impacts on water resources in light of the number of mining operations in the surrounding area and particularly given the close proximity of this project to the Bowen River. There is inadequate hydrogeological data and no predictive numerical groundwater model or regional water balance for the project site. As a result, it is difficult to draw robust conclusions on the impacts of the proposed mine on surface and groundwater resources or changes to these dynamics.
2. The Committee considers that the following are required to inform understanding of the impacts of this proposed development on groundwater behaviour and groundwater/surface water interaction:
 - i. Statistically valid data and analysis to characterise the hydraulic properties, hydrochemistry and connectivity of the alluvium and Permian sediments, including consideration of faults and whether the Permian sediments are more appropriately conceptualised as discrete aquifer units
 - ii. Revision of the groundwater conceptualisation to take into account the role of faulting and groundwater/surfacewater interactions in groundwater dynamics
 - iii. The development of a numerical model to simulate groundwater drawdown extent and rates in wet and dry seasons, including changes to groundwater/surfacewater interaction around the Bowen River during the mine operation and post-closure
 - iv. Presentation of a regional water balance that takes into account the predictions of the numerical model.

The Committee recommends that a thorough risk assessment be undertaken that is informed by the above, and identifies appropriate mitigation strategies including for any likely interaction between the mining operation and the surface water system; and

A monitoring strategy should be developed to validate the numerical model and provide early indication of water movement from the river towards the mine pit.

3. The Committee has identified that there is a potential for water flow from the river into the pit. The rate of this movement needs to be quantified through the use of an accurate numerical model."

Queensland government consideration of Points 1 to 3

In summary, the IESC recommends further work should be carried out to inform and develop a numerical groundwater model and to use the model to assist in presenting a regional water balance and a risk assessment. The extent of the hydraulic connectivity between the mining pits and the Bowen River appears to be the primary concern to the IESC.

The EIS identifies that there are uncertainties in relation to groundwater flow and impacts of mining on that flow, impacts on the Bowen River and impacts on existing groundwater users. Issues of uncertainty that have been identified include:

- connectivity between coal measures, alluvium and the Bowen River
- connectivity between coal measures and adjacent geological formations

- location of all landholder bores and their purpose of use.

DNRM's advice on the EIS recommends that additional monitoring bores be added to the existing monitoring bore network and that pump testing of the new bores be undertaken in order to increase the available data on hydraulic properties and gain a better understanding about the connection between the mining pits and the Bowen River (refer to section 4.7.2). The additional information requested by DNRM would address the connectivity issues raised by the IESC. DNRM also recommends that a rigorous landholder bore survey be undertaken to identify potential water users that may be impacted by mining activities. The proponent has committed in the SEIS to undertake both of these activities and conditions would be included in the project EA to implement these requirements.

Information from an expanded groundwater monitoring program and a landholder bore survey could then be incorporated into the development of a transient numerical model, incorporating cumulative impacts. This information could then be used to develop a regional water balance and to undertake a detailed risk assessment. It would take a period of time to gather the above information, which is beyond the timeframes of the EIS assessment process. However, the proponent should begin gathering this information now, and continue gathering information during the initial stages of the mining operation, provided that mining has not commenced within the area in close proximity to the Bowen River. Based on the mine plan in the EIS (Chapter 3, Figure 3-9) the first 5 years of mining is scheduled to occur in the northern section of West Pit 1, which, at its closest point, is 5.5km north of the Bowen River. Central Pits 3 and 4 are the closest pits to the Bowen River and mining is not scheduled to commence in these pits until years 15 and 26 respectively. Consequently, there is sufficient time to gather further information from the groundwater monitoring program prior to the commencement of mining in close proximity to the Bowen River. The requirements to prepare a numerical cumulative impacts model and regional water balance and prepare a detailed risk assessment would also be conditioned in the project EA.

Point 4 of IESC advice (Proximity of co-disposal dam to the Bowen River)

4. "The Committee has concerns regarding the implication of flooding given the close proximity of the co-disposal facility mine pit to the Bowen River, in light of the fact that the river forms the southern boundary and there is a minimal buffer zone."

Queensland government consideration of Point 4

The initial co-disposal dam is proposed to be a temporary above-ground earthen dam which would be used during the initial stages of mining to dispose of coarse rejects and fine coal tailings from the coal handling and processing plant (CHPP) until enough room was available in Central Pits 1 and 2 to allow in-pit co-disposal for the remaining mine life (see section 4.7.2 for further information about co-disposal). In the EIS released for public notification the co-disposal dam was proposed to be located about 500m (at its closest point) from the high bank of the Bowen River.

In response to the IESC issue and similar issues raised by other EIS submitters, the proponent now proposes to relocate the initial co-disposal dam a further 750m away from the Bowen River. The initial co-disposal dam is now proposed to be located 1.25km away at its closest point from the Bowen River and is above the predicted 1-in-5000-year ARI flood level of the Bowen River. While the probable maximum flood (PMF) for the Bowen River was not modelled during the EIS, it is likely that the initial co-disposal dam is also above the PMF level. This is because the initial co-disposal dam would be located on elevated topography compared to the surrounding area and generally the floodplain of the Bowen River in this reach extends to the south of the river and not the north. Furthermore, the initial co-disposal dam has been identified as being a regulated structure. Consequently, specific EA conditions would be included in the project EA to regulate its design, construction and operation.

Furthermore, the initial co-disposal dam is only proposed to be used during the first 2 years of operation and would subsequently be decommissioned and progressively rehabilitated. Therefore, its exposure to significant rainfall events would be much less than if it were to be used for the entire 26 year mine life.

Central Pits 1 and 2 are both above the PMF level of the Bowen River and both would be bunded to prevent ingress of overland flow and any inflow during local flood events. Also, Central Pits 1 and 2 would both be completely backfilled which would remove any potential for flooding after mine closure.

Consequently, the implications of flooding on the initial co-disposal dam and Central Pits 1 and 2 used for co-disposal are expected to be minimal, subject to the successful implementation of the management and mitigation measures outlined in the EIS and the EA conditions for the project.

Point 5 of the IESC advice (Flood protection and leachate from the initial co-disposal dam)

5. "The Committee provides the following recommendations:

- Further information should be provided to support the assertion that the proposed flood protection thresholds that have been adopted will be sufficient to mitigate downstream water related risks, at both the local and regional scale;
- Any redesigning of the flood mitigation infrastructure during development must identify the direct risk to ecological communities and provide adequate mitigation;
- Additional consideration should be given towards identifying the potential for leachate from the co-disposal facility to occur and impact on the water quality of the adjacent Bowen River."

Queensland government consideration of Point 5

First dot point

Central Pit 3 would be protected from flooding from the Bowen River during operations by a 1-in-2000-year ARI flood protection levee. The revised location of the co-disposal dam is above the predicted PMF level of the Bowen River. Central Pits 1 and 2 and West Pit 4 will be protected from flooding from Twelve Mile Gully during operations by 1-in-1000 and 1-in-2000-year flood levees. The probability of at least one 1-in-1000-year flood event occurring during the 26 year mine life is about 3 percent, which is considered an acceptable operational flood risk. The other pits are not located in proximity to any major watercourses. Furthermore, in the unlikely event that the levees were overtopped during operations there would be significant capacity to move water around the site between mining pits and the initial co-disposal dam. If residual floodwaters were to be discharged, their release would be subject to the quality and quantity limits specified in the EA conditions. Reference may be made to the Queensland government consideration of Point 6 below for further information about the proposed mine water release strategy.

The local flood study identified that there would be some increases in flood flows and velocities on-site as a result of flood protection infrastructure, including the Twelve Mile Gully diversion. However, the flooding impacts would not extend upstream or downstream of the project boundary. The regional flood study identified that impacts of flooding from the Bowen River would only affect project infrastructure during the most extreme flood events (i.e. 1-in-5000-year ARI flood event or greater). Flooding of this magnitude would potentially overtop Central Pit 3 (the closest mining pit to the Bowen River) and may also backflow up Twelve Mile Gully and overflow into West Pit 1 and inundate a mining haul road. This flooding is proposed to be managed by constructing a flood protection levee around Central Pit 3 (the closest mining pit to the Bowen River) and diverting Twelve Mile Gully. The new alignment of Twelve Mile Gully would be of sufficient dimensions to contain any backflow from the Bowen River. Consequently, the site water management system would be designed to effectively manage water on-site during large local and regional rainfall events, with minimal impacts on the downstream environment.

Second dot point

Any redesign of the flood protection infrastructure during operations would be subject to an EA amendment application and associated assessment of potential impacts and the implementation of suitable management and mitigation measures to protect the identified downstream environmental values. Consequently, EHP is satisfied that the proposed flood protection infrastructure is satisfactory to mitigate downstream water impacts and that there are appropriate assessment mechanisms in place to assess the impacts of any proposed changes to the project.

Third dot point

As noted in the response to Point 4 of the IESC advice above, the initial co-disposal dam has been relocated and is now proposed to be 1.25km away from the Bowen River at its closest point. Generally speaking, leachate from co-disposal dams is not known to be a common problem for coal mines in the Bowen Basin. The geochemical assessment presented in the EIS found tailings leachate to be alkaline and slightly saline with leachable concentrations of some metals. However, once hardness corrections are considered it is expected that most metals would be only slightly soluble at expected alkaline pH values and the ecotoxicity risk of leachable elements would therefore be acceptably low. A preliminary geotechnical assessment of the initial co-disposal dam footprint found the foundation soils to be structurally capable for the co-disposal dam. A detailed geotechnical investigation would be undertaken at the detailed design stage. If the investigation identified any faulting that might be conducive to seepage of tailings run-off, the foundation of the initial co-disposal dam would be lined using a low permeability clay material identified in the MIA/CHPP area. Consequently, any seepage potential of leachate from the initial co-disposal dam would be appropriately managed during the detailed project design stage.

Point 6 of the IESC advice (Local and regional water quality impacts)

6. "There is limited information provided by the proponent on the contribution of the proposed Drake Mine to local and regional water quality impacts, recognising this is already an impacted catchment from various landuses. Water quality concerns would primarily be around discharges of contaminants associated with the mines during flood periods which would need to be dealt with by the Regulator."

Queensland government consideration of Point 6

The environmental values (EVs) and water quality objectives to protect the EVs in receiving waters were identified in the SEIS. The water quality objectives will be consistent with the management intent (level of protection) for these receiving waters, which are classified as slightly to moderately disturbed. The proponent has identified the primary contaminants of concern, sources of potential surface water impacts and mitigation measures in the EIS. The proponent would be required to develop an Erosion and Sediment Control Plan and Water Management Plan as required by conditions of the project EA (Appendix 2). These plans would include the management and mitigation strategies necessary to divert clean and mine-affected water appropriately, and to manage water quality in order to protect receiving waters.

A controlled release strategy under variable flow criteria from the proposed release points into the Twelve Mile Gully diversion, and ultimately into the Bowen River, would be conditioned in the project EA. The release conditions would cover all contaminants of concern for mine-affected water releases. For example, suspended solids, is a key parameter of concern within the Burdekin Region. The release limit for suspended solids was determined based on receiving water reference site data and achievable best practice, having consideration of the Queensland Water Quality Guidelines (DERM 2010). The suspended solids release limit would apply under all flow regimes (low, medium and high flow). Environmental values and associated water quality objectives or guideline trigger values under ANZECC and ARMCANZ (2000) or the Queensland Water Quality Guidelines were used to determine stringent release contaminant trigger levels for parameters such as metals and metalloids, and other contaminants of relevance for coal mining. These trigger values would apply under all flow regimes (low, medium and high flow). Electrical conductivity (EC) is typically the key contaminant of concern for the release of mine-affected water in the Bowen Basin. The release of EC (and sulfate) would be controlled under variable flow criteria, which would ensure that only good quality, low EC water is released under low flow conditions. The maximum release rate would apply to all combined release point flows. Consequently, local and regional water quality impacts will be managed appropriately through EA conditioning. Refer to Appendix 2 for the recommended conditions of the project EA.

Point 7 of the IESC advice (Cumulative impacts on downstream water resources)

"The Drake Coal Project is located within the Bowen River catchment, downstream of other large coal mines, such as Newlands Coal Mine, and consideration should be given to the potential cumulative impacts on water resources and water dependent ecological communities in this catchment, such as the Birralelee-Pelican Creek wetlands."

Queensland government consideration of Point 7

Consideration has been given to cumulative impacts and EHP is satisfied that they are acceptable and manageable.

The existing Newlands and Eastern Creek mines are the major mines on the Bowen River upstream of the Birralelee-Pelican Creek Aggregation listed wetlands (Birralelee-Pelican Creek wetlands). However, both Newlands and Eastern Creek mines are more than 55km from the Bowen River and a further 60km from the top of the Birralelee-Pelican Creek wetlands, with significant capacity for mixing and assimilation evident both prior to entry to the Bowen River and between the Bowen River and the Birralelee-Pelican Creek wetland. Other existing coal mines such as Collinsville and Sonoma release to the Pelican Creek sub-catchment, with Pelican Creek entering the Bowen River at the most downstream point of the Birralelee-Pelican Creek wetland. The planned Jax and Sarum mines are immediately upstream of the Drake Coal Project, on the Bowen River, and approximately 30km upstream of the Birralelee-Pelican Creek wetlands. Distance is a key factor in mitigating the risk to these aquatic ecosystems as identified within the EIS, due to the potential for subsequent dilution. Queensland Wetland Mapping indicates quite significant dilution potential in the catchment area between the release points for the Drake Coal Mine, that would be located a minimum of 10km upstream of the most upstream point of the Birralelee-Pelican Creek wetlands. In addition, the mine waste characterisation indicates that there is a low risk of acid drainage and a low to medium risk of saline drainage, which further reduces the potential contamination risk associated with mine water discharges. Consequently, downstream cumulative water quality impacts are not expected to be significant if the releases are appropriately conditioned in the project EA.

The EIS identifies the Birralelee-Pelican Creek wetlands as being on the Commonwealth Directory of Important Wetlands. The wetland comprises a large 3.5km long permanent clear waterhole, located 27km downstream from the project area. The EIS concludes that the potential impacts on this wetland from normal mining operations would be negligible due to the distance of the wetland from the project. EHP agrees that the magnitude of impact is likely

to be negligible with appropriate management plans and associated mitigation measures are implemented as proposed. Furthermore, the EA would include appropriate conditioning for the release of water into Twelve Mile Gully so as to minimise the impact on the biological integrity of aquatic ecosystems in the Bowen River.

Model water conditions have been developed by EHP for coal mines in order to manage the cumulative risks from coal mine releases, and similar conditions would be applied to the Drake Coal Project. Sensitive downstream aquatic ecosystems would be considered when determining the stringency of release conditions under the model water conditions. Additional controls, such as the use of in-stream cease release limits, can also be applied in conditioning to provide further certainty with respect to the protection of these sensitive aquatic ecosystems. Furthermore, upstream and downstream compliance monitoring for mine water releases, as well as a receiving environment monitoring program (REMP) would be conditioned in the EA. The REMP would require monitoring during times of natural flow and during times of mine water release, and require a comparison with water quality objectives and guideline values designed to protect all environmental values, including the biological integrity of aquatic ecosystems, such as the Birralelee-Pelican Creek wetlands. The spatial extent of the REMP would be defined in the EA conditions, if considered necessary. The findings of the REMP can be used to inform EHP (the administering authority) as to the adequacy of the release conditions for protecting sensitive aquatic ecosystems. The release conditions can also be amended at a later date, if necessary. Consequently, cumulative impacts on water resources are expected to be negligible and the implementation of appropriate EA conditions would ensure that any unforeseen downstream cumulative impacts are identified and properly addressed.

5 Adequacy of the Environmental Management Plan (EM Plan)

The EM Plan was amended a number of times during the EIS assessment process. The most recent EM Plan, received by EHP on 31 July 2013, included recommended EA conditions based on EHP's new model mining conditions that were finalised in June 2013.

Changes to the EP Act about the content requirements for an EA application came into force on 31 March 2013. These changes included the repeal of the requirement for a proponent to submit an EM Plan that meets the content requirements of section 203 of the EP Act. However, as the Drake Coal Project already had an active EA application under assessment prior to 31 March 2013, the transitional provisions of the EP Act still require the proponent to submit an EM Plan that meets the content requirements of the previous section 203 of the EP Act.

EHP has assessed the submitted EM Plan against the statutory content requirements of the EP Act and found that additional information is required with regard to: the environmentally relevant activities (ERAs) and notifiable activities applicable to the project; a map of various project infrastructure; a map of surface water release points; a map of dust deposition monitoring locations; a surface water discharge electrical conductivity (EC) trigger value; rehabilitation requirements; a more detailed description of aquatic ecology values and potential impacts; impacts of the Twelve Mile Gully diversion on in-stream aquatic habitat; sediment and erosion control measures proposed during construction of the Twelve Mile Gully diversion; and clarification of the biological integrity of the downstream surface water environment.

It is recommended that the proponent seeks advice on the various aspects of the EM Plan and proposed EA conditions from the delegate responsible for assessing the EA, located in the Environmental Services and Regulation (Mining) unit in EHP's Emerald Office, before submitting any amended documentation. EHP will require an amended EM Plan to be submitted by the proponent, before the draft EA conditions can be completed.

Matters that should be addressed in the revised EM Plan include:

- ERAs and notifiable activities
 - o a number of ERAs and notifiable activities have been included in the EM Plan which may not apply to the project and need to be reviewed and deleted if found not to be applicable. These include ERAs: 56 Regulated waste storage; 57 Regulated waste transport; 58 Regulated waste treatment; 64 Water treatment; and 8(3b) Chemical storage; and notifiable activities: 25 Mineral processing; 27 Pest control; and 33 Scrap yards
- Sewage treatment and disposal
 - o provide a map showing the location and layout of the STP and associated infrastructure
 - o provide a map showing the proposed size and location of the effluent irrigation areas
- Downstream environmental values
 - o clarify the inconsistency in the EM Plan about whether the downstream environmental values at the project site are classified as slightly-moderately disturbed, or highly disturbed and adjust the proposed surface water quality trigger values according to the correct classification

- Aquatic ecology
 - o provide additional information about the tolerance ranges of aquatic taxa present and the potential impacts of the project on these aquatic communities
- Water quality monitoring locations
 - o provide a map showing the proposed locations of the upstream and downstream surface water quality monitoring points
- Air quality monitoring locations
 - o provide a map showing the proposed locations of the dust depositional monitoring gauges
- Twelve Mile Gully diversion
 - o provide additional information about the potential impacts of the Twelve Mile Gully diversion on the in-stream aquatic habitats
 - o provide more detailed management and mitigation measures to address sediment and erosion control during the construction of the Twelve Mile Gully diversion
- Appendix A - Proposed EA conditions
 - o provide an assessment for using the proposed non-locally relevant surface water quality electrical conductivity (EC) trigger value of 1000 μ S/cm, instead of the site-specific relevant Queensland Water Quality Guidelines (2009) trigger value of 271 μ S/cm
 - o liaise with EHP's Emerald Office about including areas of disturbance and additional rehabilitation completion criteria in Condition H1 - Table H1 (Rehabilitation requirements).

6 Recommendations about the suitability of the project

EHP has considered the TOR, the submitted EIS, all submissions on the submitted EIS, and the standard criteria. The submitted EIS has not identified any detrimental impacts of sufficient magnitude to prevent the project from proceeding.

7 Recommendations for conditions for any approval

7.1 Environmental Protection Act 1994 (EP Act)

Before the project can commence, the proponent must obtain an environmental authority under Chapter 5, Part 5, Division 2 of the EP Act, as in place prior to 31 March 2013. The EA would be issued only when a suitable EM Plan is provided by the proponent. Section 202 of that version of the EP Act (which is applicable under the statutory transitional arrangements, states that the purpose of the EM Plan is to propose environmental protection commitments to help the administering authority prepare conditions for the project EA. EHP considers that the EM Plan submitted on 31 July 2013 is inadequate in some aspects to the degree that EHP cannot finalise conditions for the draft EA (see part 5 of this report).

However, as required by section 59(d) of the EP Act, this report does include some recommended EA conditions for air quality, water, regulated dams, noise, waste and land. The recommended conditions are contained in Appendix 2. The model mining conditions and the model conditions for regulated dams were considered in the development of the recommended EA conditions. The proposed conditions are not considered complete or finalised and are provided for consideration by EHP's Emerald Office when developing draft EA conditions for the project under the EP Act, upon receipt of a revised EM Plan that addresses the matters outlined in part 5 of this report.

7.2 Approvals under other legislation

A number of other approvals for the Drake Coal Project have been identified in section 3.2 of this report. Conditions for these other approvals would be developed during the relevant application and assessment processes. Consequently, there are no recommendations for conditions for any other approvals in this assessment report.

8 Approved by

Lindsay Delzoppo

Signature

Lindsay Delzoppo
Director, Statewide Environmental Assessments
Department of Environment and Heritage Protection

10 September 2013

Date

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Appendix 1 - Requirements sought by the Department of Transport and Main Roads

Finalising the Road Impact Assessment

That the proponent completes the following no later than six months prior to the commencement of any significant project construction works:

1. Update and finalise the road impact assessment (RIA) based on the proponent's latest project traffic generation projections, to identify and deal with all transport impacts on the safety and efficiency of State-controlled roads in accordance with the DTMR Guidelines for Assessment of Road Impacts of Development 2006 (GARID), in consultation with the Manager (Project Planning and Corridor Management) of the DTMR Mackay/Whitsunday Regional Office. The updated RIA must address the following matters:
 - assess impacts north and south of the accommodation centre at Collinsville of traffic not directly related to the transport of workers to and from the mine site and identify any required mitigation measures
 - undertake an Australian Level Crossing Assessment Model (ALCAM) assessment of the impact of increased train movements and project-related traffic on the safety and performance of the existing at grade level crossings of the SCR and identify any required mitigation measures
 - assess the impact of project-related heavy vehicle movements in terms of ESAs (in addition to vehicle numbers) and identify any required mitigation measures
 - submit the updated RIA to the Manager (Project Planning and Corridor Management) of the DTMR Mackay/Whitsunday Regional Office for review and approval.

Preparing the Road Use Management Plan

That the proponent completes the following no later than 6 months prior to the commencement of any significant project construction works:

2. Prepare a road-use management plan (RMP) for all use of State-controlled roads for each phase of the project, in consultation with the Manager (Project Planning and Corridor Management) of the DTMR Mackay/Whitsunday Regional Office and in accordance with DTMR's Guide to Preparing a Road Use Management Plan (attached). The RMP must summarise:
 - latest traffic generation (vehicle/ESA numbers, routes etc.)
 - finalised assessment of impacts on safety, efficiency and condition at intersections, level crossings, on road links and on pavements etc.
 - updated impact mitigation strategies both "hard" (infrastructure, such as adequate project access to the SCR) and "soft" (such as road safety strategies - dealing with worker/driver fatigue), and any other necessary improvements or contributions towards road maintenance and so on.

That the proponent submits the RMP to the Manager (Project Planning and Corridor Management) of the DTMR Mackay/Whitsunday Regional Office for review and approval.

Permits, Approvals, Finalising detailed drawings and preparation of Traffic Management Plan/s for any required roadworks

3. That the proponent, no later than 3 months prior to the commencement of any significant project-related construction traffic, (or such other period as agreed in writing with DTMR), complete the following:
 - prepare detailed drawings for any works required to mitigate the impacts of project-related traffic for review and approval by DTMR;
 - obtain road corridor permit approvals for any accesses to, works or other activities in State-controlled road corridors;
 - prepare a Traffic Management Plan/s (TMP) in accordance with DTMR's Guide to Preparing a Traffic Management Plan (attached). The TMP/s must be approved by DTMR and will be required to be implemented during the construction and commissioning of any site accesses, road intersection or other works undertaken in the State-controlled road corridor;
 - obtain the necessary permits for any excess mass or over-dimensional loads associated with the project as required under the *Transport Operations (Road Use Management) Act 1995*;

- consult with DTMR's Transport Services Division or State-wide Heavy Vehicles Unit, the Queensland Police Service and the Whitsunday Regional Council to ensure these excess mass or over-dimensional transport movements are safely undertaken, without damaging infrastructure.

State-controlled road access

4. That prior to the commencement of significant project-related construction, the proponent will:
 - Upgrade the intersection/access between the Bowen Developmental Road and mine access road in accordance with the following requirements, unless otherwise agreed in writing with the DTMR Mackay/Whitsunday Regional Office:
 - o provide a minimum CHR and AUL configuration in accordance with the DTMR Road Planning and Design Manual (RPDM). The intersection/ access is to include appropriate safe storage and separation from the adjacent rail crossing and shall be designed to a 120km/h design speed and the largest design vehicle
 - o provide intersection lighting in accordance with part 17 of the RPDM, if required
 - o provide all other necessary access/intersections to the State-controlled road to a standard agreed upon by DTMR and in accordance with the RPDM
 - o provide any other mine related facilities (for example, coal conveyors) in accordance with the requirements of DTMR and the RPDM
 - o prior to undertaking any of these works, obtain the relevant licenses and permits under the TI Act for works and mine facilities/infrastructure within the State-controlled road corridor.

Completing required road works before significant project development

5. That the proponent will, prior to the commencement of any significant project-related construction traffic, complete the following, unless otherwise agreed in writing with the DTMR Mackay/Whitsunday Regional Office:
 - construct any required road works before commencement of project-related construction traffic
 - prior to undertaking any works, obtain the relevant licenses and permits under the TI Act for works within the state-controlled road corridor. Any required plans, permits and TMPs must be approved by DTMR three months prior to commencement of project construction traffic
 - implement the approved Traffic Management Plan for the works during construction and commissioning of the above mentioned intersection upgrade.

Appendix 2 - Recommended conditions for the Drake Coal Project environmental authority (resource activities)

Schedule A: General	
Condition number	Condition
A1	Scope of activity This environmental authority authorises the mining of 10 million tonnes run of mine coal per annum.
A2	This environmental authority authorises environmental harm referred to in the conditions. Where there is no condition or this environmental authority is silent on a matter, the lack of a condition or silence does not authorise environmental harm.
A3	In carrying out the mining activity authorised by this environmental authority, disturbance of land: a) may occur in the areas marked 'A' b) must not occur in the areas marked 'B' c) may occur in the areas marked 'C' on the map that is annexure 1D to this environmental authority, but only in accordance with condition A4.
A4	Any disturbance within the areas marked 'C' on the map that is annexure 1D to this environmental authority: a) is only authorised to the extent reasonably necessary for a road, fence, underground service, low-impact telecommunications facility, electrical sub-station, transmission grid works and supply network works, storage depots, similar minor infrastructure and ancillary facilities for any of the above minor infrastructure. b) any disturbance within areas marked 'A' or 'C' is not to impact adversely on areas marked 'B'.
A5	The holder of this environmental authority must: a) install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority. b) maintain such measures, plant and equipment in a proper and efficient condition. c) operate such measures, plant and equipment in a proper and efficient manner. d) ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.
A6	Monitoring Except where specified otherwise in another condition of this environmental authority, all monitoring records or reports required by this environmental authority must be kept for a period of not less than 5 years.

A7	Financial assurance The activity must not be carried out until the environmental authority holder has given financial assurance to the administering authority as security for compliance with this environmental authority and any costs or expenses, or likely costs or expenses, mentioned in section 298 of the Act.
A8	The amount of financial assurance must be reviewed by the holder of this environmental authority when a plan of operations is amended or replaced or the authority is amended.
A9	Risk Management The holder of this environmental authority must develop and implement a risk management system for mining activities which mirrors the content requirement of the Standard for Risk Management (ISO31000:2009), or the latest edition of an Australian standard for risk management, to the extent relevant to environmental management, within 3 months from date of issue of this environmental authority.
A10	Notification of emergencies, incidents and exceptions The holder of this environmental authority must notify the administering authority by written notification within 24 hours, after becoming aware of any emergency or incident which results in the release of contaminants not in accordance, or reasonably expected to be not in accordance with, the conditions of this environmental authority.
A11	Within 10 business days following the initial notification of an emergency or incident, or receipt of monitoring results, whichever is the latter, further written advice must be provided to the administering authority, including the following: a) results and interpretation of any samples taken and analysed. b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm. c) proposed actions to prevent a recurrence of the emergency or incident.
A12	Complaints The holder of this environmental authority must record all environmental complaints received about the mining activities including: a) name, address and contact number for of the complainant. b) time and date of complaint. c) reasons for the complaint. d) investigations undertaken. e) conclusions formed. f) actions taken to resolve the complaint. g) any abatement measures implemented. h) person responsible for resolving the complaint.
A13	The holder of this environmental authority must, when requested by the administering authority, undertake relevant specified monitoring within a reasonable timeframe nominated or agreed to by the administering authority to investigate any complaint of environmental harm. The results of the investigation (including an analysis and interpretation of the monitoring results) and abatement measures, where implemented, must be provided to the administering authority within 10 business days of completion of the investigation, or no later than 10 business days after the end of the timeframe nominated by the administering authority to undertake the investigation.

A14	Third-party reporting The holder of this environmental authority must: a) within 1 year of the commencement of this environmental authority, obtain from an appropriately qualified person a report on compliance with the conditions of this environmental authority. b) obtain further such reports at regular intervals, not exceeding 3 yearly intervals, from the completion of the report referred to above; and c) provide each report to the administering authority within 90 days of its completion.
A15	Where a condition of this environmental authority requires compliance with a standard, policy or guideline published externally to this environmental authority and the standard is amended or changed subsequent to the issue of this environmental authority, the holder of this environmental authority must: a) comply with the amended or changed standard, policy or guideline within 2 years of the amendment or change being made, unless a different period is specified in the amended standard or relevant legislation, or where the amendment or change relates specifically to regulated structures referred to in condition I6, the time specified in that condition. b) until compliance with the amended or changed standard, policy or guideline is achieved, continue to remain in compliance with the corresponding provision that was current immediately prior to the relevant amendment or change.
Schedule B: Air	
Condition number	Condition
B1	The Proponent shall ensure that all reasonable and feasible avoidance and mitigation measures are employed so that the dust and particulate matter emissions generated by the mining activities do not cause exceedances of the following levels when measured at any sensitive or commercial place: a) Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air—Determination of particulate matter—Deposited matter – Gravimetric method. b) A concentration of particulate matter with an aerodynamic diameter of less than 10 micrometres (PM10) suspended in the atmosphere of 50 micrograms per cubic metre over a 24-hour averaging time, for no more than 5 exceedances recorded each year, when monitored in accordance with the most recent version of either: 1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 high volume sampler with size-selective inlet – Gravimetric method; or 2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM10 low volume sampler—Gravimetric method. c) A concentration of particulate matter suspended in the atmosphere of 90 micrograms per cubic metre over a 1 year averaging time, when monitored in accordance with the most recent version of AS/NZS3580.9.3:2003 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—Total suspended particulate matter (TSP)—High volume sampler gravimetric method.

Schedule C: Waste Management	
Condition number	Condition
C1	Unless otherwise permitted by the conditions of this environmental authority or with prior approval from the administering authority and in accordance with a relevant standard operating procedure, waste must not be burnt.
C2	The holder of this environmental authority may burn vegetation cleared in the course of carrying out extraction activities provided the activity does not cause environmental harm at any sensitive place or commercial place.
C3	Tailings disposal Tailings must be managed in accordance with procedures contained within the current plan of operations. These procedures must include provisions for: 1. containment of tailings. 2. the management of seepage and leachates both during operation and the foreseeable future. 3. the control of fugitive emissions to air. 4. a program of progressive sampling and characterisation to identify acid producing potential and metal concentrations of tailings. 5. maintaining records of the relative locations of any other waste stored within the tailings. 6. rehabilitation strategy. 7. monitoring of rehabilitation, research and/or trials to verify the requirements and methods for decommissioning and final rehabilitation of tailings, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.
C4	Acid sulfate soils Treat and manage acid sulfate soils in accordance with the latest edition of the Queensland Acid Sulfate Soil Technical Manual.
Schedule D: Noise	
Condition number	Condition
D1	Noise nuisance The holder of this environmental authority must ensure that noise generated by the mining activities does not cause the criteria in Table D1 – Noise limits to be exceeded at a sensitive place or commercial place.

Table D1 – Noise limits

Sensitive Place						
Noise level dB(A) measured as:	Monday to Saturday			Sundays and Public Holidays		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am

<i>LAeq, adj, 15 mins</i>	CV = 50 AV = 5	CV = 45 AV = 5	CV = 40 AV = 0	CV = 45 AV = 5	CV = 40 AV = 5	CV = 35 AV = 0
<i>LA1, adj, 15 mins</i>	CV = 55 AV = 10	CV = 50 AV = 10	CV = 45 AV = 5	CV = 50 AV = 10	CV = 45 AV = 10	CV = 40 AV = 5
Commercial Place						
<i>Noise level dB(A) measured as:</i>	<i>Monday to Saturday</i>			<i>Sundays and Public Holidays</i>		
	<i>7am to 6pm</i>	<i>6pm to 10pm</i>	<i>10pm to 7am</i>	<i>7am to 6pm</i>	<i>6pm to 10pm</i>	<i>10pm to 7am</i>
<i>LAeq, adj, 15 mins</i>	CV = 55 AV = 10	CV = 50 AV = 10	CV = 45 AV = 5	CV = 50 AV = 10	CV = 45 AV = 10	CV = 40 AV = 5

Table D1 – Noise limits notes:

1. CV = Critical Value
2. AV = Adjustment Value
3. To calculate noise limits in Table D1:
If $bg \leq (CV - AV)$:
Noise limit = $bg + AV$
If $(CV - AV) < bg \leq CV$:
Noise limit = CV
If $bg > CV$:
Noise limit = $bg + 0$
4. In the event that measured bg (LA90, adj, 15 mins) is less than 30 dB(A), then 30 dB(A) can be substituted for the measured background level
5. bg = background noise level (LA90, adj, 15 mins) measured over 3-5 days at the nearest sensitive receptor
6. If the project is unable to meet the noise limits as calculated above alternative limits may be calculated using the processes outlined in the "Planning for Noise Control" guideline.

D2	Airblast overpressure nuisance The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and air blast overpressure in Table D2 – Blasting noise limits to be exceeded at a sensitive place or commercial place.
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Table D2 – Blasting noise limits

Blasting noise limits	Sensitive or commercial blasting noise limits	
	Monday – Sunday 9am - 7pm	Other times and public holidays
Airblast overpressure	115dB (Linear) Peak for 4 out of 5 consecutive blasts initiated and not greater than 120dB (Linear) Peak at any time	No blasting impacts to occur

Ground vibration peak particle velocity	5mm/second peak particle velocity for 4 out of 5 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time	No blasting impacts to occur
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D3	Monitoring and reporting Noise monitoring and recording must include the following descriptor characteristics and matters: a) LAN,T (where N equals the statistical levels of 1, 10 and 90 and T = 15 mins). b) background noise LA90. c) the level and frequency of occurrence of impulsive or tonal noise and any adjustment and penalties to statistical levels. d) atmospheric conditions including temperature, relative humidity and wind speed and directions. e) effects due to any extraneous factors such as traffic noise. f) location, date and time of monitoring. g) if the complaint concerns low frequency noise, Max LpLIN,T and one third octave band measurements in dB(LIN) for centre frequencies in the 10 – 200Hz range.
D4	The holder of this environmental authority must develop and implement a blast monitoring program to monitor compliance with Table D2 – Blasting noise limits for: a) at least 25% of all blasts undertaken on this site in each year at the nearest sensitive place or commercial place located to the blasting. b) all blasts conducted during any time period specified by the administering authority at the nearest sensitive place or commercial place.
Schedule E: Groundwater	
Condition number	Condition
E1	The holder of this environmental authority must not release contaminants to groundwater.
E2	Monitoring and reporting All determinations of groundwater quality and biological monitoring must be performed by an appropriately qualified person.
E3	Groundwater quality and levels must be monitored at the locations and frequencies defined in Table – E1 Groundwater monitoring locations and frequency and annexure 1F for quality characteristics identified in Table E2 - Groundwater quality triggers and limits .

Table E1 – Groundwater monitoring locations and frequency

Monitoring Point ¹	Location		Surface RL (m) ²	Monitoring Frequency
	Longitude (GDA94 – decimal degree)	Latitude (GDA94 – decimal degree)		
Reference Bores ³				
BR752	147.8546	-20.7050	164.3	Quarterly
DK1301	147.8204 (approx.)	-20.7505 (approx.)	TBA	Quarterly
DK014	147.8250	-20.7444	138.0	Quarterly
Compliance Bores				
BR993	147.8159	-20.6885	159.2	Quarterly
DKWBO2A	147.8292	-20.7484	136.9	Quarterly
DKWBO2B	147.8249	-20.7443	141.4	Quarterly
DK1302	147.8127 (approx.)	-20.7503 (approx.)	TBA	Quarterly
DK1303	147.8001 (approx.)	-20.7515 (approx.)	TBA	Quarterly

1. Monitoring is not required where a bore has been removed as a direct result of the mining activity.
2. RL must be measured to the nearest 5cm from the top of the bore casing.
3. Reference sites must:
 - a. have a similar flow regime;
 - b. be from the same bio-geographic and climatic region;
 - c. have similar geology, soil types and topography; and
 - d. not be so close to the test sites that any disturbance at the test site also results in a change at the reference site.

Table E2 - Groundwater quality triggers and limits

Parameter	Contaminant Triggers	Contaminant Limit
pH	To be determined ¹	To be determined ¹
Hardness (µg/L)		
Ammonia-N (µg/L)		
Nitrate-N (µg/L)		
Nitrite-N (µg/L)		
Sulfate (µg/L)		
Total Dissolved Solids (µg/L)		

Parameter	Contaminant Triggers	Contaminant Limit
Aluminium (µg/L)		
Arsenic (µg/L)		
Boron (µg/L)		
Cadmium (µg/L)		
Chromium (µg/L)		
Copper (µg/L)		
Fluoride (µg/L)		
Lead (µg/L)		
Mercury (µg/L)		
Molybdenum (µg/L)		
Nickel (µg/L)		
Selenium (µg/L)		
Zinc (µg/L)		
Benzene (µg/L)		
Carbon tetrachloride (µg/L)		

1. Groundwater contaminant parameters and trigger levels as per Table E2 - Groundwater quality triggers and limits must be finalised based on a background groundwater monitoring program inclusive of the three new bores and be submitted to the administering authority by commencement of mining operations.

2. The quality characteristics required to be monitored as per Table E2 - Groundwater quality triggers and limits can be reviewed once the results of 2 years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from Table E2 - Groundwater quality triggers and limits by amendment.

E4	Groundwater levels when measured at the monitoring locations specified in Table E1 - Groundwater monitoring locations and frequency must not exceed the groundwater level trigger change thresholds specified in Table E3 - Groundwater level monitoring below.
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Table E3 - Groundwater level monitoring

Monitoring location	Level trigger threshold
BR993	2m reduction
BR752	Bores target coal measures
DKWB02A	5 m reduction
DKWB02B	Bores target alluvium in proximity to the Bowen River where baseline monitoring has shown

Monitoring location	Level trigger threshold
DK014	level fluctuations of >4m
DK1302	
DK1303	

E5	Exceedance Investigation If quality characteristics of groundwater from compliance bores identified in Table E1 - Groundwater monitoring locations and frequency exceed any of the trigger levels stated in Table E2 - Groundwater quality triggers and limits or exceed any of the groundwater level trigger threshold stated in Table E3 - Groundwater level monitoring, the holder of this environmental authority must compare the compliance monitoring bore results to the reference bore results and complete an investigation in accordance with the ANZECC and ARMCANZ 2000.
E6	Results of monitoring of groundwater from compliance bores identified in Table E1 - Groundwater monitoring locations and frequency, must not exceed any of the limits defined in Table E2 - Groundwater quality triggers and limits.
E7	Bore construction and maintenance and decommissioning The construction, maintenance and management of groundwater bores (including groundwater monitoring bores) must be undertaken in a manner that prevents or minimises impacts to the environment and ensures the integrity of the bores to obtain accurate monitoring.
E8	Groundwater monitoring program A Groundwater monitoring program must be developed by an appropriately qualified person that will determine compliance with the environmental authority conditions, prior to the commencement of mining activities. The groundwater monitoring program must include at a minimum; a) location of monitoring bores and groundwater aquifers to be monitored; b) proposed frequency of monitoring of groundwater levels and water quality; d) groundwater monitoring within the following formations: i. Bowen River alluvium ii. Moranbah coal measures iii. Exmoor formation and iv. Blenheim subgroup. Monitoring results must be provided to the administering authority upon request. <i>Note the review must include the assessment of groundwater levels and quality data, and the suitability of the monitoring network. The assessment must be submitted to the administering authority within 28 days of receiving the report. Sampling as per E8- d), i-iv, must commence at least 12 months prior to the commencement of dewatering activities.</i>

E9	Stygofauna monitoring The holder of this environmental authority must undertake an initial Stygofauna pilot sampling study in accordance with <i>Guideline No.54a: Sampling Methods and Survey Considerations for Subterranean Fauna in Western Australia</i> in the following bores to be constructed in the alluvium associated with the Bowen River: • Bore DK1301 • Bore DK1302 • Bore DK1303 If stygofauna are identified during the pilot sampling study that are determined to be endemic to the area and are also determined to be at risk of mining related impacts, further sampling should be undertaken and the results should be given to the administering authority.
Schedule F: Water	
Condition number	Condition
F1	Contaminant release Contaminants that will, or have the potential to cause environmental harm must not be released directly or indirectly to any waters as a result of the authorised mining activities, except as permitted under the conditions of this environmental authority.
F2	Unless otherwise permitted under the conditions of this environmental authority, the release of mine affected water to waters must only occur from the release points specified in Table F1 - Mine affected water release points, sources and receiving waters and depicted in annexure 1A and 1B attached to this environmental authority.
F3	The release of mine affected water to internal water management infrastructure installed and operated in accordance with a water management plan that complies with condition F27 is permitted.

Table F1 – Mine affected water release points, sources and receiving waters

Release Point (RP)	Latitude (decimal degree, GDA94)	Longitude (decimal degree, GDA94)	Mine Affected Water Source and Location	Monitoring Point	Receiving waters description
DRP1	-20.7025	147.7917	West pit 1 and overburden dump	At end of pipe	Un-named drainage feature → Twelve Mile Gully → Bowen River
DRP2	-20.7106	147.8303	Central pit 1 and overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP3	-20.7214	147.7906	West pit 1 and overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP4	-20.6765	147.8086	West pit 2 and	At end of	Sandy Hollow →

			overburden dump	pipe	Twelve Mile Gully → Bowen River
DRP5	-20.6661	147.8449	East pit 1 and overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP6	-20.6820	147.8458	East 3/4 overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP7	-20.6894	147.8428	East pit 2/3 and overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP8	-20.6928	147.8425	East pit 2/3 and overburden dump	At end of pipe	Twelve Mile Gully → Bowen River
DRP9	-20.6660	147.8004	West pit 2 and overburden dump	At end of pipe	Sandy Hollow → Twelve Mile Gully → Bowen River
DRP10	-20.7336	147.8226	Initial co-disposal dam	At end of	Twelve Mile Gully
DRP11	-20.7260	147.8329	MIA control pond	At end of	Twelve Mile Gully
DRP12	-20.7303	147.8276	MIA control pond	At end of	Twelve Mile Gully

F4	The release of mine affected water to waters in accordance with condition F2 must not exceed the release limits stated in Table F2 - Mine affected water release limits when measured at the monitoring points specified in Table F1 - Mine affected water release points, sources and receiving waters for each quality characteristic.
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Table F2 - Mine affected water release limits

Quality Characteristic	Release Limits	Monitoring frequency	Comment
<i>Electrical conductivity (uS/cm)</i>	<i>Release limits specified in Table F4 for variable flow criteria or condition F10.</i>	<i>Daily during release (the first sample must be taken within 2 hours of commencement of release)</i>	
<i>pH (pH Unit)</i>	<i>6.5 (minimum) 9.0 (maximum)</i>	<i>Daily during release (the first sample must be taken within 2 hours of commencement of release)</i>	
<i>Turbidity (NTU)</i>	<i>Limit derived from suspended solids limit and demonstrated correlation between turbidity to suspended solids historical monitoring data for dam water*</i>	<i>Daily during release* (first sample within 2 hours of commencement of release)</i>	<i>Turbidity is required to assess ecosystems impacts and can provide instantaneous results.</i>
<i>Suspended solids (mg/L)</i>	<i>Limit to be determined based on receiving water reference data and achievable best practice</i>	<i>Daily during release* (first sample within two hours of commencement of</i>	<i>Suspended solids are required to measure the performance of</i>

Quality Characteristic	Release Limits	Monitoring frequency	Comment
	<i>sedimentation control and treatment*</i>	<i>release)</i>	<i>sediment and erosion control measures.</i>
<i>Sulphate (SO₄²⁻) (mg/L)</i>	<i>Release limits specified in Table 4 for variable flow criteria.</i>	<i>Daily during release* (first sample within two hours of commencement of release)</i>	<i>Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC.</i>

*Note: *Limit for suspended solids can be omitted if turbidity limit is included. Limit for turbidity not required if suspended solids limit included. Both indicators should be measured in all cases.*

Table F3 - Release contaminant trigger investigation levels, potential contaminants

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring frequency
<i>Aluminium</i>	<i>55</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	<i>Commencement of release and thereafter weekly during release</i>
<i>Arsenic</i>	<i>13</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Cadmium</i>	<i>0.2</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Chromium</i>	<i>1</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Copper</i>	<i>2</i>	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
<i>Iron</i>	<i>300</i>	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
<i>Lead</i>	<i>4</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Mercury</i>	<i>0.2</i>	<i>For aquatic ecosystem protection, based on LOR for CV FIMS</i>	
<i>Nickel</i>	<i>11</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Zinc</i>	<i>8</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Boron</i>	<i>370</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	

Quality Characteristic	Trigger Levels (µg/L)	Comment on Trigger Level	Monitoring frequency
<i>Cobalt</i>	<i>90</i>	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
<i>Manganese</i>	<i>1900</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Molybdenum</i>	<i>34</i>	<i>For aquatic ecosystem protection, based on low reliability guideline</i>	
<i>Selenium</i>	<i>10</i>	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
<i>Silver</i>	<i>1</i>	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
<i>Uranium</i>	<i>1</i>	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
<i>Vanadium</i>	<i>10</i>	<i>For aquatic ecosystem protection, based on LOR for ICPMS</i>	
<i>Ammonia</i>	<i>900</i>	<i>For aquatic ecosystem protection, based on SMD guideline</i>	
<i>Nitrate</i>	<i>1100</i>	<i>For aquatic ecosystem protection, based on ambient Qld WQ Guidelines (2006) for TN</i>	
<i>Petroleum hydrocarbons (C6-C9)</i>	<i>20</i>	<i>Model condition</i>	
<i>Petroleum hydrocarbons (C10-C36)</i>	<i>100</i>	<i>Model condition</i>	
<i>Fluoride (total)</i>	<i>2000</i>	<i>Protection of livestock and short term irrigation guideline</i>	
<i>Sodium</i>	<i>460</i>	<i>Irrigation value based on ANZECC 2000</i>	
<i>Suspended Solids</i>	<i>150</i>	<i>Based on receiving water reference data</i>	
<i>Sulphate (SO₄²⁻) (mg/L)</i>	<i>250</i>	<i>Drinking water environmental values from NHMRC 2006 guidelines OR ANZECC</i>	

Table F3 - Release contaminant trigger investigation levels, potential contaminants notes:

1. All metals and metalloids must be measured as total (unfiltered) and dissolved (filtered). Trigger levels for metal/metalloids apply if dissolved results exceed trigger.

2. The quality characteristics required to be monitored as per **Table F3 - Release contaminant trigger investigation levels, potential contaminants** can be reviewed once the results of 2 years monitoring data is available, or if sufficient data is available to adequately demonstrate negligible environmental risk, and it may be determined that a reduced monitoring frequency is appropriate or that certain quality characteristics can be removed from **Table F3 - Release contaminant trigger investigation levels, potential contaminants** by

amendment.

3. SMD – slightly moderately disturbed level of protection, guideline refers ANZECC & ARMICANZ (2000).

4. LOR – typical reporting for method stated. ICPMS/CV FIMS – analytical method required to achieve LOR.

F5	The release of mine affected water to waters from the release points must be monitored at the locations specified in Table F1 - Mine affected water release points, sources and receiving waters for each quality characteristic and at the frequency specified in Table F2 - Mine affected water release limits and Table F3 - Release contaminant trigger investigation levels, potential contaminants. <i>Note: the administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition F5 is contravened due to a temporary lack of safe or practical access. The administering authority expects the environmental authority holder to take all reasonable and practicable measures to maintain safe and practical access to designated monitoring locations.</i>
F6	If quality characteristics of the release exceed any of the trigger levels specified in Table F3 - Release contaminant trigger investigation levels, potential contaminants during a release event, the environmental authority holder must compare the downstream results in the receiving waters to the trigger values specified in Table F3 - Release contaminant trigger investigation levels, potential contaminants and: a) where the trigger values are not exceeded then no action is to be taken; or b) where the downstream results exceed the trigger values specified Table F3 - Release contaminant trigger investigation levels, potential contaminants for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and 1. if the result is less than the background monitoring site data, then no action is to be taken; or 2. if the result is greater than the background monitoring site data, complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 90 days of receiving the result , outlining (i) details of the investigations carried out (ii) actions taken to prevent environmental harm. <i>Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with F6 b (2) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.</i>
F7	If an exceedance in accordance with condition F6 b (2) is identified, the holder of the environmental authority must notify the administering authority in writing within 24 hours of receiving the result.
F8	Mine affected water release events The holder must ensure a stream flow gauging station/s is installed, operated and maintained to determine and record stream flows at the locations and flow recording frequency specified in Table F3 - Release contaminant trigger investigation levels, potential contaminants.
F9	Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with condition F2 must only take place during periods of natural flow in accordance with the receiving water flow criteria for discharge specified in Table F4 - Mine affected water release during flow events for the release point(s) specified in Table F1 - Mine affected water release points, sources and receiving waters.

F10	The release of mine affected water to waters in accordance with condition F2 must not exceed the Maximum Release Rate (for all combined release point flows) for each receiving water flow criterion for discharge specified in Table F4 - Mine affected water release during flow events when measured at the monitoring points specified in Table F1 - Mine affected water release points, sources and receiving waters .
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Table F4—Mine affected water release during flow events

Receiving waters/ stream	Release Point (RP)	Gauging station	Gauging Station Latitude (decimal degree, GDA94)	Gauging Station Longitude (decimal degree, GDA94)	Receiving Water Flow Recording Frequency	Receiving Water Flow Criteria for discharge (m ³ /s)	Maximum release rate (for all combined RP flows)	Electrical Conductivity Release Limits
Bowen River	DRP1	Bowen River at Jacks Creek 120209B	-20.7524	147.8818	Continuous (minimum daily)	Low Flow < 1.5 m ³ /s for a period of 28 days after natural flow events that exceed 1.5 m ³ /s	0.5 m ³ /s	Electrical conductivity (uS/cm): <TBA
	DRP2					Medium Flow > 1.5 m ³ /s	< 1.5 m ³ /s	Electrical conductivity (uS/cm): <TBA
	DRP3						< 3 m ³ /s	Electrical conductivity (uS/cm): <TBA
	DRP4					High Flow > 5 m ³ /s	< 5 m ³ /s	Electrical conductivity (uS/cm): <TBA
	DRP5							
	DRP6							
	DRP7							
	DRP8							
	DRP9							
	DRP10							
	DRP11							
	DRP12							

F11	The daily quantity of mine affected water released from each release point must be measured and recorded.
F12	Releases to waters must be undertaken so as not to cause erosion of the bed and banks of the receiving waters, or cause a material build up of sediment in such waters.

F13	The environmental authority holder must notify the administering authority as soon as practicable and no later than 24 hours after commencing to release mine affected water to the receiving environment. Notification must include the submission of written advice to the administering authority of the following information: a) release commencement date/time b) details regarding the compliance of the release with the conditions of Department Interest: Water of this environmental authority (that is, contaminant limits, natural flow, discharge volume) c) release point/s d) release rate e) release salinity f) receiving water/s including the natural flow rate. <i>Note: Notification to the administering authority must be addressed to the Manager and Project Manager of the local Administering Authority via email or facsimile.</i>
F14	The environmental authority holder must notify the administering authority as soon as practicable and nominally no later than 24 hours after cessation of a release event of the cessation of a release notified under Condition F14 and within 28 days provide the following information in writing: a) release cessation date/time b) natural flow rate in receiving water c) volume of water released d) details regarding the compliance of the release with the conditions of Department Interest; Water of this environmental authority (i.e. contaminant limits, natural flow, discharge volume) e) all in-situ water quality monitoring results f) any other matters pertinent to the water release event. <i>Note: Successive or intermittent releases occurring within 24 hours of the cessation of any individual release can be considered part of a single release event and do not require individual notification for the purpose of compliance with conditions F14 and F15, provided the relevant details of the release are included within the notification provided in accordance with conditions F14 and F15.</i>
F15	Notification of release event exceedance If the release limits defined in Table F2 - Mine affected water release limits are exceeded, the holder of the environmental authority must notify the administering authority within 24 hours of receiving the results.
F16	The authority holder must, within 28 days of a release that exceeds the conditions of this authority, provide a report to the administering authority detailing: a) the reason for the release; b) the location of the release; c) all water quality monitoring results; d) any general observations; e) all calculations; and f) any other matters pertinent to the water release event.

F17	Receiving Environment Monitoring and Contaminant Trigger Levels The quality of the receiving waters must be monitored at the locations specified in Table F6 - Receiving water upstream background sites and downstream monitoring points for each quality characteristic and at the monitoring frequency stated in Table F5 - Receiving waters contaminant trigger levels.
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Table F5 - Receiving waters contaminant trigger levels

<i>Quality Characteristic</i>	<i>Trigger Level</i>	<i>Monitoring Frequency</i>
<i>pH</i>	<i>6.5 – 9.0</i>	<i>Daily during the release</i>
<i>Electrical Conductivity (µS/cm)</i>	<i>TBA</i>	
<i>Suspended solids (mg/L)</i>	<i>150</i>	
<i>Sulphate (SO42-) (mg/L)</i>	<i>250</i>	

Table F6 - Receiving water upstream background sites and downstream monitoring points

<i>Monitoring Points</i>	<i>Receiving Waters Location Description</i>	<i>Latitude (decimal degree, GDA94)</i>	<i>Longitude (decimal degree, GDA94)</i>
Upstream Background Monitoring Points			
SW03	Upstream of Twelve Mile Gully tributaries and mining operations	-20.7115	147.8559
SW07	Upstream of un-named tributary of Bowen River	-20.7434	147.8523
BR01	Upstream of mining operations at Bowen River	-20.7525	147.8484
SW11	Upstream of un-named tributary of Twelve Mile Gully	-20.6977	147.8283
Downstream Background Monitoring Points			
SW04	Downstream of mining operations at Twelve Mile Gully	-20.7314	147.7849
SW05	Downstream of mining operations at Sandy Hollow	-20.6918	147.8018
BR02	Downstream of mining operations at Bowen River	-20.7534	147.8277
SW12	Upstream of un-named tributary of Twelve Mile Gully	-20.7040	147.8320
SW13	Downstream of mining operations at un-named tributary of Twelve Mile Gully	-20.7066	147.7845

Table F6 - Receiving water upstream background sites and downstream monitoring points notes:

- The upstream monitoring point should be within 5 km the release point.
- The downstream point should not be greater than 5 km from the release point.
- The data from background monitoring points must not be used where they are affected by releases from other mines.

F18	If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in Table F5 - Receiving waters contaminant trigger levels during a release event the environmental authority holder must compare the downstream results to the upstream results in the receiving waters and: a) where the downstream result is the same or a lower value than the upstream value for the quality characteristic then no action is to be taken; or b) where the downstream results exceed the upstream results complete an investigation into the potential for environmental harm and provide a written report to the administering authority in the next annual return, outlining i. details of the investigations carried out ii. actions taken to prevent environmental harm. <i>Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with F18 b) of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.</i>
F19	All determinations of water quality and biological monitoring must be performed by an appropriately qualified person.
F20	Receiving Environment Monitoring Program (REMP) The environmental authority holder must develop and implement a Receiving Environment Monitoring Program (REMP) to monitor, identify and describe any adverse impacts to surface water environmental values, quality and flows due to the authorised mining activity. This must include monitoring the effects of the mine on the receiving environment periodically (under natural flow conditions) and while mine affected water is being discharged from the site. For the purposes of the REMP, the receiving environment is the waters of the Bowen River and connected or surrounding waterways within 5 km downstream of the release. The REMP should encompass any sensitive receiving waters or environmental values downstream of the authorised mining activity that will potentially be directly affected by an authorised release of mine affected water.
F21	A REMP Design Document that addresses the requirements of the REMP must be prepared and made available to the administering authority upon request.
F22	A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and made available on request to the administering authority. This must include an assessment of background reference water quality, the condition of downstream water quality compared against water quality objectives, and the suitability of current discharge limits to protect downstream environmental values.
F23	Water reuse Mine affected water may be piped or trucked or transferred by some other means that does not contravene the conditions of this environmental authority and deposited into artificial water storage structures, such as farm dams or tanks, or used directly at properties owned by the environmental authority holder or a third party (with the consent of the third party).

F24	Annual water monitoring reporting The following information must be recorded in relation to all water monitoring required under the conditions of this environmental authority and submitted to the administering authority in the specified format: a) the date on which the sample was taken b) the time at which the sample was taken c) the monitoring point at which the sample was taken d) the measured or estimated daily quantity of mine affected water released from all release points e) the release flow rate at the time of sampling for each release point f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.
F25	Temporary Interference with waterways Destroying native vegetation, excavating, or placing fill in a watercourse, lake or spring necessary for and associated with mining operations must be undertaken in accordance with Department of Natural Resources and Mines (or its successor) <i>Guideline – Activities in a Watercourse, Lake or Spring associated with Mining Activities</i>.
F26	Water management plan A Water Management Plan must be developed by an appropriately qualified person and implemented.
F27	A copy of the water management plan must be provided to the administering authority on request.
F28	Saline drainage The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of saline drainage.
F29	Acid rock drainage The holder of this environmental authority must ensure proper and effective measures are taken to avoid or otherwise minimise the generation and/or release of acid rock drainage.
F30	Stormwater and water sediment controls An Erosion and Sediment Control Plan must be developed by an appropriately qualified person and implemented for all stages of the mining activities on the site to minimise erosion and the release of sediment to receiving waters and contamination of stormwater.
F31	Stormwater, other than mine affected water, is permitted to be released to waters from: a) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition F30 b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with condition F26, for the purpose of ensuring water does not become mine affected water.

Schedule G: Rehabilitation	
Condition number	Condition
G1	Land disturbed by mining must be rehabilitated in accordance with Table G1 - Rehabilitation Requirements.

Table G1 - Rehabilitation Requirements

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
Surface facilities including mine waste	Waste rock dumps Drainage line diversions Topsoil stockpiles	Long-term safety	Structurally sound and safe for humans and animals with no hazardous materials	Designed and built by SQP for structural soundness.	Areas assessed by SQP as being structurally sound.
				Contaminated land assessment.	Contaminated land is managed appropriately in accordance with the relevant administering authority guideline/s.
				Presence of heavy metals and toxic materials.	Action taken to prevent ongoing contamination.
				Fauna species on-site.	Evidence of fauna using the area.
		Non-polluting	Hazardous materials adequately managed	Exposure to and availability of heavy metals and other toxic materials.	Action taken to prevent ongoing exposure.
				Contaminated land assessment.	Contaminated land is appropriately in accordance with the relevant administering authority guideline/s.
				Rejects layers are capped with at least 1.5m of waste rock material.	Action is detailed in the plan of operations.
				Polluted water contained on-site	Monitoring results indicate site-caused pollution has not occurred.
				Rehabilitation of	Vegetation cover

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
			<i>drill pads</i>	<i>described in the environmental authority have been rehabilitated.</i>	<i>across drill pads is similar to the surrounding environment.</i>
			<i>Diversion design and maintenance achieves appropriate erosion rates</i>	<i>Stream bank stability.</i>	<i>Stream banks no longer require ongoing management.</i>
				<i>Surface water monitoring required under the environmental authority indicates similar water quality between the upstream and downstream monitoring points.</i>	<i>Monitoring results indicate site-caused pollution has not occurred.</i>
		<i>Stable landform</i>	<i>Very low probability of slope slippage or failure with serious environmental consequences</i>	<i>Past record of slope failure.</i>	<i>Nil records of slope failure; if slope failure has occurred it is rectified and ongoing design accounts for the previous failure.</i>
			<i>Landform design achieves appropriate erosion rates</i>	<i>Slope angle and length.</i>	<i>Designed as appropriate by a SQP.</i>
				<i>Maximum slope ranges are as follows: Waste Rock Dumps = 11.5°</i>	<i>Slope requirements are met.</i>
				<i>Engineered structures to control water flow.</i>	<i>Water flows occur as designed.</i>
				<i>Rates of "soil" loss.</i>	<i>Soil loss is minimal as assessed by a SQP or reflected in downstream monitoring points.</i>
				<i>Dimensions and frequency of occurrence of erosion rills and gullies are no greater than that in the corresponding reference sites.</i>	<i>Erosion rills and gullies are similar in characteristics to reference sites.</i>
			<i>Vegetation cover to minimise erosion</i>	<i>Vegetation type and density.</i>	<i>Type and density suit the underlying soil characteristics.</i>

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				<i>Foliage cover.</i>	<i>Healthy and abundant.</i>
				<i>Leaf litter, humus, depth of growing medium.</i>	<i>Growing medium depth allows suitable vegetation to grow.</i>
			<i>Very low probability of rock falls with serious environmental consequences</i>	<i>Geotechnical studies.</i>	<i>Designed as low probability by SQP.</i>
				<i>Past record of rock falls.</i>	<i>Past record shows nil rock falls or when they have occurred that appropriate actions have occurred to rectify the issue.</i>
			<i>The diversions and run off drainage lines mirror natural stream functions</i>	<i>Designed and constructed in accordance with the relevant Queensland Government guideline/s.</i>	<i>Deisgned by a SQP.</i>
				<i>Steam bank erosion rates</i>	<i>Diversion designed by a SQP to achieve minimal erosion rates.</i>
		<i>Sustainable land use</i>	<i>Soil properties support the desired land use</i>	<i>Chemical properties (e.g. pH, salinity, nutrients, trace elements) of topsoil and in soil profiles support the proposed vegetation.</i>	<i>Monitoring results indicate the chemical properties are appropriate for proposed land use.</i>
				<i>Physical properties (e.g. depth of top soil, plant available water capacity (PAWC)).</i>	<i>Monitoring results indicate the physical properties are appropriate for proposed land use.</i>
				<i>Biological properties (e.g. nutrient cycling, microbial biomass, invertebrates).</i>	<i>Monitoring results indicate the biological properties are appropriate for proposed land use.</i>
				<i>The following indicators are comparable with reference sites: Organic matter;</i>	<i>Monitoring results show the indicators are comparable with the reference site.</i>

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				Soil nutrients; Invertebrate activity; Topsoil depth; Growth media depth; Physical and chemical property limits; Folia nitrogen and phosphorus.	
				Ongoing monitoring to establish positive trends for the rehabilitation of the site compared with reference landscapes, including: Soil stability; Infiltration capacity; Nutrient cycling; Nutrient capacity; Species recruitment; Habitat complexity; Vegetation dynamics; and Seasonal change.	Monitoring results indicate positive trends for the rehabilitation in comparison with the reference site.
Infrastructure	MIA ROM pad CHPP Haul roads and tracks	Long-term safety	Structurally sound and safe for humans and animals with no hazardous materials	Assessed and approved by a SQP for structural soundness.	Areas designed by SQP as being structurally sound.
				Contaminated land assessment.	Contaminated land is managed appropriately in accordance with the relevant administering authority guideline/s.
				Presence of heavy metals and toxic materials.	Action taken to prevent ongoing contamination.
				Fauna species on-site.	Evidence of fauna using the area.
		Non-polluting	Hazardous materials adequately managed	Exposure to and availability of heavy metals and other toxic materials.	Action taken to prevent ongoing exposure.

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				<i>Contaminated land assessment.</i>	<i>Contaminated land is appropriately in accordance with the relevant administering authority guideline/s.</i>
			<i>Polluted water contained on-site</i>	<i>Downstream and upstream surface and groundwater monitoring.</i>	<i>Monitoring results indicate site-caused pollution has not occurred.</i>
			<i>Diversion design and maintenance achieves appropriate erosion rates</i>	<i>Stream bank stability.</i>	<i>Stream banks no longer require ongoing management.</i>
				<i>Surface water monitoring required under the environmental authority indicates similar water quality between the upstream and downstream monitoring points.</i>	<i>Monitoring results indicate site-caused pollution has not occurred.</i>
		<i>Stable landform</i>	<i>Very low probability of slope slippage or failure with serious environmental consequences</i>	<i>Past record of slope failure.</i>	<i>Nil records of slope failure; if slope failure has occurred it is rectified and ongoing design accounts for the previous failure.</i>
			<i>Landform design achieves appropriate erosion rates</i>	<i>Slope angle and length.</i>	<i>Designed as appropriate by a SQP.</i>
				<i>Maximum slope ranges are as follows: Infrastructure & ROM areas = 10° Roads and tracks = 5.7°</i>	<i>Slope requirements are met.</i>
				<i>Engineered structures to control water flow.</i>	<i>Water flows occur as designed.</i>
				<i>Rates of "soil" loss.</i>	<i>Soil loss is minimal as assessed by a SQP or reflected in downstream monitoring points.</i>

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				<i>Dimensions and frequency of occurrence of erosion rills and gullies are no greater than that in the corresponding reference sites.</i>	<i>Erosion rills and gullies are similar in characteristics to reference sites.</i>
			<i>Vegetation cover to minimise erosion</i>	<i>Vegetation type and density.</i>	<i>Type and density suit the underlying soil characteristics.</i>
				<i>Foliage cover.</i>	<i>Healthy and abundant.</i>
				<i>Leaf litter, humus, depth of growing medium.</i>	<i>Growing medium depth allows suitable vegetation to grow.</i>
		<i>Sustainable land use</i>	<i>Soil properties support the desired land use</i>	<i>Chemical properties (e.g. pH, salinity, nutrients, trace elements) of topsoil and in soil profiles support the proposed land use.</i>	<i>Monitoring results indicate the chemical properties are appropriate for proposed land use.</i>
				<i>Physical properties (e.g. depth of top soil, plant available water capacity (PAWC)).</i>	<i>Monitoring results indicate the physical properties are appropriate for proposed land use.</i>
				<i>Biological properties (e.g. nutrient cycling, microbial biomass, invertebrates).</i>	<i>Monitoring results indicate the biological properties are appropriate for proposed land use.</i>
				<i>The following indicators are comparable with reference sites:</i> <i>Organic matter;</i> <i>Soil nutrients;</i> <i>Invertebrate activity;</i> <i>Topsoil depth;</i> <i>Growth media depth;</i> <i>Physical and chemical property limits;</i> <i>Folia nitrogen and phosphorus.</i>	<i>Monitoring results show the indicators are comparable with the reference site.</i>

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				Ongoing monitoring to establish positive trends for the rehabilitation of the site compared with reference landscapes, including: Soil stability; Infiltration capacity; Nutrient cycling; Nutrient capacity; Species recruitment; Habitat complexity; Vegetation dynamics; and Seasonal change.	Monitoring results indicate positive trends for the rehabilitation in comparison with the reference site.
Voids and dams	Residual voids Dams (all storage types)	Long-term safety	Structurally sound and safe for humans and animals with no hazardous materials	Assessed and approved by a SQP for structural soundness.	Areas designed by SQP as being structurally sound.
				Contaminated land assessment.	Contaminated land is managed appropriately in accordance with the relevant administering authority guideline/s.
				Presence of heavy metals and toxic materials.	Action taken to prevent ongoing contamination.
				Fauna species on-site.	Evidence of fauna using the area.
		Non-polluting	Hazardous materials adequately managed	Exposure to and availability of heavy metals and other toxic materials.	Action taken to prevent ongoing exposure.
				Contaminated land assessment.	Contaminated land is appropriately in accordance with the relevant administering authority guideline/s.
			Polluted water contained on-site	Downstream and upstream surface and groundwater	Monitoring results indicate site-caused pollution has not

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				<i>monitoring.</i>	<i>occurred.</i>
			<i>Diversion design and maintenance achieves appropriate erosion rates</i>	<i>Stream bank stability.</i>	<i>Stream banks no longer require ongoing management.</i>
				<i>Surface water monitoring required under the environmental authority indicates similar water quality between the upstream and downstream monitoring points.</i>	<i>Monitoring results indicate site-caused pollution has not occurred.</i>
		<i>Stable landform</i>	<i>Very low probability of slope slippage or failure with serious environmental consequences</i>	<i>Past record of slope failure.</i>	<i>Nil records of slope failure; if slope failure has occurred it is rectified and ongoing design accounts for the previous failure.</i>
			<i>Landform design achieves appropriate erosion rates</i>	<i>Slope angle and length.</i>	<i>Designed as appropriate by a SQP.</i>
				<i>Maximum slope ranges are as follows: Residual Voids (high wall) = 65° Residual Voids (low wall) = 45° Co-disposal Facility Top = 11.5° Co-disposal Facility Wall = 11.5°</i>	<i>Slope requirements are met.</i>
				<i>Engineered structures to control water flow.</i>	<i>Water flows occur as designed.</i>
				<i>Rates of "soil" loss.</i>	<i>Soil loss is minimal as assessed by a SQP or reflected in downstream monitoring points.</i>
				<i>Dimensions and frequency of occurrence of erosion rills and gullies are no greater than that in the corresponding</i>	<i>Erosion rills and gullies are similar in characteristics to reference sites.</i>

Mine Domain	Mine Feature Name	Rehabilitation Goal	Rehabilitation Objectives	Indicators	Completion Criteria
				<i>reference sites.</i>	
			<i>Vegetation cover to minimise erosion</i>	<i>Vegetation type and density.</i>	<i>Type and density suit the underlying soil characteristics.</i>
				<i>Foliage cover.</i>	<i>Healthy and abundant.</i>
				<i>Leaf litter, humus, depth of growing medium.</i>	<i>Growing medium depth allows suitable vegetation to grow.</i>
			<i>Very low probability of rock falls with serious environmental consequences</i>	<i>Geotechnical studies.</i>	<i>Designed as low probability by SQP.</i>
				<i>Past record of rock falls.</i>	<i>Past record shows nil rock falls or when they have occurred that appropriate actions have occurred to rectify the issue.</i>
			<i>The diversions and run off drainage lines mirror natural stream functions</i>	<i>Designed and constructed in accordance with the relevant Queensland Government guideline/s.</i>	<i>Designed by a SQP.</i>
				<i>Stream bank erosion rates</i>	<i>Diversion designed by a SQP to achieve minimal erosion rates.</i>
		<i>Sustainable land use</i>	<i>Soil properties support the desired land use</i>	<i>Chemical properties (e.g. pH, salinity, nutrients, trace elements) of topsoil and in soil profiles support the proposed land use.</i>	<i>Monitoring results indicate the chemical properties are appropriate for proposed land use.</i>
				<i>Physical properties (e.g. depth of top soil, plant available water capacity (PAWC)).</i>	<i>Monitoring results indicate the physical properties are appropriate for proposed land use.</i>
				<i>Biological properties (e.g. nutrient cycling, microbial biomass, invertebrates).</i>	<i>Monitoring results indicate the biological properties are appropriate for proposed land use.</i>

G2	Rehabilitation must commence progressively in accordance with the plan of operations.
G3	Contaminated land Before applying for surrender of a mining lease, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the mining lease which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use.
G4	Before applying for progressive rehabilitation certification for an area, the holder must (if applicable) provide to the administering authority a site investigation report under the Act, in relation to any part of the area the subject of the application which has been used for notifiable activities or which the holder is aware is likely to be contaminated land, and also carry out any further work that is required as a result of that report to ensure that the land is suitable for its final land use under condition G1.
G5	Minimise the potential for contamination of land by hazardous contaminants.
G6	Biodiversity management The holder of this environmental authority must provide an offset for impacts on applicable state significant biodiversity values, in accordance with Queensland Biodiversity Offset Policy. The biodiversity offset must be consistent with the requirements for an offset as identified in the Biodiversity Offset Strategy (as per condition G7) and must be provided: a) prior to impacting on state significant biodiversity values; or b) where a land based offset is to be provided, within 12 months of the later of either of the following i. the date of issue of this environmental authority; or ii. the relevant stage identified in the Biodiversity Offset Strategy submitted under condition G7; or c) where an offset payment is to be provided, within 4 months of the later of either of the following i. the date of issue of this environmental authority; or ii. the relevant stage identified in the Biodiversity Offset Strategy submitted under conditions G7.
G7	A Biodiversity Offset Strategy must be developed and submitted to the administering authority within either 30 days, or a lesser period agreed to by the administering authority, prior to impacting on the applicable state significant biodiversity values.
G8	Residual voids Residual voids must comply with the following outcomes: a) Residual voids must not cause any serious environmental harm to land, surface waters or any recognised groundwater aquifers, other than the environmental harm constituted by the existence of the residual void itself and subject to any other condition within this environmental authority; b) Residual voids must comply with Schedule G - Table G1 Rehabilitation Requirements; and c) At the completion of decommissioning and rehabilitation, all residual voids must be protected from Probable Maximum Floods (PMFs) from nearby watercourses such that the protection is sustainable for the foreseeable future.

Schedule H: Dams	
Condition number	Condition
H1	Assessment of hazard category The hazard category of any structure must be assessed by a suitably qualified and experienced person: a) in accordance with the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM365)</i>; and b) in any of the following situations: i. prior to the design and construction of the structure; or ii. prior to any change in its purpose or the nature of its stored contents; and iii. in accordance with the <i>Manual for assessing Hazard Categories and Hydraulic Performance of Dams</i>.
H2	A hazard assessment report and certification must be prepared for any structure assessed and the report may include a hazard assessment for more than one structure .
H3	The holder must, on receipt of a hazard assessment report and certification , provide to the administering authority one paper copy and one electronic copy of the hazard assessment report and certification .
H4	Certification must be provided by the suitably qualified and experienced person who undertook the assessment, in the form set out in the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635)</i> .
H5	The holder must take reasonable and practical measures so that each dam associated with the mining activity is designed, constructed, operated and maintained in accordance with accepted engineering standards and is fit for the purpose for which it is intended.
H6	Design and construction of a regulated structure All regulated structures must be designed by, and constructed under the supervision of, a suitably qualified and experienced person in accordance with the requirements of the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635)</i>.
H7	Construction of a regulated structure is prohibited unless the holder has: a) submitted a hazard category assessment report and certification to the administering authority; b) commissioned a suitably qualified and experienced person to prepare a design plan for the structure; and c) received the certification from a suitably qualified and experienced person for the design and design plan and the associated operating procedures in compliance with the relevant condition of this authority.
H8	Certification must be provided by the suitably qualified and experienced person who oversees the preparation of the design plan, in the form set out in the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635)</i> .

H9	Regulated structures must: a) be designed and constructed in accordance with and conform to the requirements of the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams</i>; b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of: i. floodwaters from entering the regulated dam from any watercourse or drainage line; and ii. wall failure due to erosion by floodwaters arising from any watercourse or drainage line. c) have the floor and sides of the dam designed and constructed to prevent or minimise the passage of the wetting front and any entrained contaminants through either the floor or sides of the dam during the operational life of the dam and for any period of decommissioning and rehabilitation of the dam.
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H10	The design plan for a regulated structure must include, but is not limited to: a) certification that the design plan: i. is in accordance with the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams</i>, including subsidiary certifications if necessary; and ii. addresses the requirements in H10(b) to (i) b) A design report which provides: i. a description of all the documents which constitute the design plan; ii. a statement of: a) the applicable standards including engineering criteria, industry guidelines, relevant legislation and regulatory documents, relied upon in preparing the design plan; and b) all relevant facts and data used in preparing the design plan, including any efforts made to obtain necessary facts and data, and any limitations or assumptions to facts and data used in preparing the design plan; c) the hazard category of the regulated structure; and d) setting out the reasoning of the suitably qualified and experienced person who has certified the design plan, as to how the design plan provides the necessary required performance; iii. documentation of hydrological analyses and estimates required to determine all elements of the design including volumes and flow capacities; iv. detailed criteria for the design, operation, maintenance and decommissioning of the regulated structure, including any assumptions; v. design, specification and operational rules for any related structures and systems used to prevent failure scenarios; c) Drawings showing the lines and dimensions, and locations of built structures and land forms associated with the regulated structure; d) Consideration of the interaction of the pit design with the levee or regulated dam design; e) A description of the containment system implemented. f) An operational plan that includes: i. normal operating procedures and rules (including clear documentation and definition of process inputs in the DSA allowance); ii. contingency and emergency action plans including operating procedures designed to avoid and/or minimise environmental impacts including threats to human life resulting from any overtopping or loss of structural integrity of the regulated structure; g) A plan for the decommissioning and rehabilitation of the regulated structure at the end of its operational life; h) Details of reports on investigations and studies done in support of the design plan; i) Any other matter required by the suitably qualified and experienced person.
H11	Certification by the suitably qualified and experienced person who supervises the construction must be submitted to the administering authority on the completion of construction of the regulated structure, and state that: a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure; b) construction of the regulated structure is in accordance with the design plan.

H12	Where a regulated dam is to be managed as part of an integrated containment system and the DSA volume is to be shared across the integrated containment system, the design and operating rules for the system as a whole must be documented in a system design plan that is certified by a suitably qualified and experienced person .
H13	The system design plan must contain: a) the design plans, and b) the 'as constructed' plans, and c) the operational rules for each individual regulated dam that forms part of the integrated system, and d) the standards of serviceability and accessibility of water transfer equipment or structures, and e) the operational rules for the system as a whole.
H14	Operation of a regulated structure Operation of a regulated structure is prohibited unless: a) the holder has submitted to the administering authority: i. one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition H38, and ii. a set of 'as constructed' drawings and specifications, and iii. certification of those 'as constructed drawings and specifications' in accordance with condition H11, and iv. where the regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, a copy of the certified system design plan. b) the requirements of this authority relating to the construction of the regulated structure have been met; and c) the holder has entered the details required under this authority, into a Register of Regulated Dams.
H15	Each regulated structure must be maintained and operated in a manner that is consistent with the current design plan, the current operational plan, and the associated certified 'as constructed' drawings for the duration of its operational life until decommissioned and rehabilitated.
H16	The holder must take reasonable and practicable control measures to prevent the causing of harm to persons, livestock or wildlife through the construction and operation of a regulated structure . Reasonable and practicable control measures may include, but are not limited to: a) the secure use of fencing, bunding or screening; and b) escape arrangements for trapped livestock and fauna.
H17	Mandatory reporting level The Mandatory Reporting Level (the MRL) must be marked on a regulated dam in such a way that during routine inspections of that dam, it is clearly observable.
H18	The holder must, as soon as practical and within forty-eight (48) hours of becoming aware, notify the administering authority when the level of the contents of a regulated dam reaches the MRL .
H19	The holder must, immediately on becoming aware that the MRL has been reached, act to prevent the occurrence of any unauthorised discharge from the regulated dam.

H20	Annual inspection report Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.
H21	At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed: a) against the most recent hazard assessment report and design plan (or system design plan); b) against recommendations contained in previous annual inspections reports; c) against recognised dam safety deficiency indicators; d) for changes in circumstances potentially leading to a change in hazard category; e) for conformance with the conditions of this authority; f) for conformance with the 'as constructed' drawings; g) for the adequacy of the available storage in each regulated dam, based on an actual observation or observations taken after 31 May each year but prior to 1 November of that year, of accumulated sediment, state of the containment barrier and the level of liquids in the dam (or network of linked containment systems); h) for evidence of conformance with the current operational plan.
H22	A suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and including recommended actions to ensure the integrity of the regulated structure.
H23	The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635)</i>.
H24	The holder must: a) upon receipt of the annual inspection report, consider the report and its recommendations and take action to ensure that the regulated structure will safely perform its intended function; and b) within twenty (20) business days of receipt of the annual inspection report, notify the administering authority in writing, of the recommendations of the inspection report and the actions being taken to ensure the integrity of each regulated structure.
H25	A copy of the annual inspection report must be provided to the administering authority upon request and within ten (10) business days.
H26	Design storage allowance On 1 November of each year, storage capacity must be available in each regulated dam (or network of linked containment systems with a shared DSA volume), to meet the Design Storage Allowance (DSA) volume for the dam (or network of linked containment systems).
H27	The holder must, as soon as possible and within forty-eight (48) hours of becoming aware that the regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, notify the administering authority.
H28	The holder must, immediately on becoming aware that a regulated dam (or network of linked containment systems) will not have the available storage to meet the DSA volume on 1 November of any year, act to prevent the occurrence of any unauthorised discharge from the regulated dam or linked containment systems.

H29	Performance review The holder must assess the performance of each regulated dam or linked containment system over the preceding November to May period based on actual observations of the available storage in each regulated dam or linked containment system taken prior to 1 July of each year.
H30	The holder must take action to modify its water management or linked containment system so as to ensure that the regulated dam or linked containment system will perform in accordance with the requirements of this authority, for the subsequent November to May period. <i>Note: Action may include seeking the necessary approvals for physical modification of a regulated dam.</i>
H31	Transfer arrangements The holder must provide a copy of any reports, documentation and certifications prepared under this authority, including but not limited to any Register of Regulated Structures, hazard assessment, design plan and other supporting documentation, to a new holder and the administering authority on transfer of this authority.
H32	Decommissioning and rehabilitation Prior to the cessation of the environmentally relevant activity, each regulated structure must be decommissioned such that: a) ongoing environmental harm is minimised by the regulated structure: - becoming a safe site for humans and animals at the completion of rehabilitation; or - becoming a stable landform, that no longer contains flowable substances and minimises erosion impacts; or - not allowing for acid mine drainage; or - being approved or authorised under relevant legislation for a beneficial use; or - being a void authorised by the administering authority to remain after decommissioning; and b) the regulated structure is compliant with all other relevant rehabilitation requirements of this authority.
H33	Regulated structure location and performance Each regulated structure named in Column 1, of Schedule H - Table H1 must be wholly located within the control points noted in columns 2 and 3 of Schedule H - Table H1, below, for that structure.

Table H1 – Location of regulated structures

Column 1	Column 2	Column 3	Column 4 Levees only
Name of Regulated Structure(1)	Latitude(2) (GDA 94)	Longitude(2) (GDA 94)	Unique Location ID(3)
Initial co-disposal dam and levee	-20.7354 -20.7326 -20.7386 -20.7413	147.8207 147.8294 147.8326 147.8240	CD1

Column 1	Column 2	Column 3	Column 4 Levees only
Name of Regulated Structure(1)	Latitude(2) (GDA 94)	Longitude(2) (GDA 94)	Unique Location ID(3)
Co-disposal in-pit storage Central Pit 1	-20.7062 -20.7061 -20.7179 -20.7185	147.8383 147.8523 147.8519 147.8383	N/A
Co-disposal in-pit storage Central Pit 2 and levee	-20.7185 -20.7207 -20.7271 -20.7308 -20.7256	147.8445 147.8475 147.8463 147.8375 147.8338	CPL2
West Pit levee 1	-20.7233 -20.7234 -20.7334 -20.7348 -20.7351	147.8148 147.8257 147.8258 147.8220 147.8144	WPL1
Central Pit 3 levee	-20.7349 -20.7345 -20.7461 -20.7462 -20.7434 -20.7398	147.8425 147.8470 147.8469 147.8378 147.8292 147.8292	CPL3
Central Pit 4 levee	-20.7288 -20.7289 -20.7366 -20.7364 -20.7336	147.8301 147.8345 147.8346 147.8320 147.8301	CPL4

1. The 'name of the regulated structure' should refer to the name for example, process residue facility and decant dam.

2. A minimum of three control points is required to constrain the location of all activities associated with the regulated structure. Additional infrastructure which forms part of any regulated dam may include appurtenant works consisting of seepage collections systems, runoff diversion bunds, containment systems, pressure relief wells, decant and recycle water systems. Note that details on tailing discharge pipelines would be included in this table only if they have not been included in the design plan required in condition H10.

3. This location reference is the reference for schedule I Table H4 flood level and crest level.

H34	Each regulated dam named in column 1 of Schedule H—Table H2, must be consistent with the details noted in columns 2 through to and including 7 of Schedule H - Table H2, below, for that dam .
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Schedule H—Table H2 (Basic Details of Regulated Dams)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7
Name of Regulated Dam	Hazard Category	Surface area of dam at spillway (ha)	Max. volume of dam at spillway (m ³)	Max. depth of dam at spillway (m)	Spillway Level (mAHD)	Use of dam
Initial co-disposal dam	Significant	TBA ¹	TBA ¹	TBA ¹	TBA ¹	Co-disposal dam to receive coarse and fine rejects from the CHPP
Co-disposal in-pit storage Central Pit 1	Significant	TBA ¹	TBA ¹	TBA ¹	TBA ¹	Co-disposal facilities to receive coarse and fine rejects from the CHPP
Co-disposal in-pit storage Central Pit 2	Significant	TBA ¹	TBA ¹	TBA ¹	TBA ¹	Co-disposal facilities to receive coarse and fine rejects from the CHPP

1. The name of the regulated dam should refer to the name of the dam, for example, process residue facility and decant dam and should be the same name used in Schedule I Table H1 for the dam.

2. For regulated dams which do not require a dam wall, input the maximum void depth, for example, where dams are formed by excavating below the land surface or backfilling a residual void.

3. The use or purpose of the regulated dam should outline the designed function, for example, 'the permanent containment of tailings resulting from the extraction of nickel, cobalt and other metals at the XYZ refinery'.

H35	Each regulated dam named in column 1 of Schedule H – Table H1, must meet the hydraulic performance criteria noted in columns 2 through to and including 4 of Schedule H - Table H3, below, for that dam .
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Schedule H—Table H3 (Hydraulic Performance of Regulated Dams)

Column 1	Column 2	Column 3	Column 4
Name of Regulated dam	Spillway Capacity AEP	Design Storage Allowance AEP	Mandatory Reporting Level AEP
Initial co-disposal dam	0.0002	TBA ¹	TBA ¹
Co-disposal in-pit storage Central Pit 1	N/A (no spillway)	TBA ¹	TBA ¹
Co-disposal in-pit storage Central Pit 2	N/A (no spillway)	TBA ¹	TBA ¹

H36	Each regulated levee named in column 1 of Schedule H – Table H1, must be consistent with the details noted in columns 2 through to and including 6 of Schedule H - Table H4, below, for that levee .
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Schedule H—Table H4 (Basic Details of Regulated Levees)

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
Name of Regulated levee	Design AEP	Design Flood Level¹ (mAHD)	Minimum Levee Level¹ (mAHD)	Schedule D Table 1 Location ID¹	Use of levee
<i>Initial co-disposal levee</i>	<i>0.0002</i>	<i>TBA²</i>	<i>TBA²</i>	<i>CD1</i>	<i>Prevention of flood waters entering the co-disposal area</i>
<i>Central Pit 2 levee</i>	<i>0.0002</i>	<i>TBA²</i>	<i>TBA²</i>	<i>CPL2</i>	<i>Prevention of flood waters entering the pit area</i>
<i>West Pit levee 1</i>	<i>0.001</i>	<i>TBA²</i>	<i>TBA²</i>	<i>WPL1</i>	<i>Prevention of flood waters entering the pit area</i>
<i>Central Pit 3 levee</i>	<i>0.0002</i>	<i>TBA²</i>	<i>TBA²</i>	<i>CPL3</i>	<i>Prevention of flood waters entering the pit area</i>
<i>Central Pit 4 levee</i>	<i>0.001</i>	<i>TBA²</i>	<i>TBA²</i>	<i>CPL4</i>	<i>Prevention of flood waters entering the pit area</i>

1. Design flood levels, and hence regulated levee levels, are expected to vary along the length of that levee. The location IDs listed (Column 5) must correspond with location IDs listed in Schedule H Table H1 and, together with Columns 3 and 4, define the minimum design level envelope for the longitudinal crest of the structure.

H37	Register of Regulated Dams A Register of Regulated Dams must be established and maintained by the holder and include, as a minimum, the following information for each regulated dam: - Date of entry in the register; - Name of the dam, its purpose and intended/actual contents; - Location of the dam defined by coordinates (latitude and longitude in GDA94) within five metres at any point from the outside of the dam including its storage area; - The hazard category of the dam as assessed using the <i>Manual for Assessing Hazard Categories and Hydraulic Performance of Dams (EM635)</i>; - Dates, names, and reference numbers of all document(s) lodged as part of a design plan for the dam; - Name and qualifications of the suitably qualified and experienced person who certified the design plan and 'as constructed' drawings; - For the regulated dam, other than in relation to any levees – - The dimensions (metres) and surface area (hectares) of the dam measured at the footprint of the dam; Dam crest volume (megalitres); - Spillway crest level (metres AHD). - Maximum operating level (metres AHD); - Storage rating table of stored volume versus level (metres AHD); Design storage allowance (megalitres) and associated level of the dam (metres AHD); Mandatory reporting level (metres AHD); - The design plan title and reference relevant to the dam; - The date construction was certified as compliant with the design plan; - The name and details of the suitably qualified and experienced person who certified that the constructed dam was compliant with the design plan; - Details of the composition and construction of any liner; - The system for the detection of any leakage through the floor and sides of the dam; - Dates when the regulated dam underwent an annual inspection for structural and operational adequacy, and to ascertain the available storage volume for 1 November of any year; - Dates when recommendations and actions arising from the annual inspection were provided to the administering authority; - Dam water quality as obtained from monitoring required under this authority as at 1 November of each year.
H38	The holder must provisionally enter the required information in the Register of Regulated Dams when a design plan for a regulated dam is submitted to the administering authority.
H39	The holder must make a final entry of the required information in the Register of Regulated Dams once compliance with condition H14 has been achieved.
H40	The holder must ensure that the information contained in the Register of Regulated Dams is current and complete on any given day.
H41	All entries in the Register of Regulated Dams must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.

H42	The holder must, at the same time as providing the annual return, supply to the administering authority a copy of the records contained in the Register of Regulated Dams, in the electronic format required by the administering authority.
H43	Repair requirements Where the holder detects any passage of the wetting front through the floor or sides of a regulated dam they must, as soon as practicable: a) repair the regulated dam to rectify the detected passage of the wetting front or entrained contaminants through the floor or sides of the regulated dam; or b) decommission and rehabilitate the regulated dam.