

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

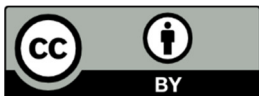
for the Rolleston Coal Expansion Project  
proposed by Glencore Coal Queensland Pty Ltd



Prepared by: Impact Assessment and Operational Support, Department of Environment and Heritage Protection

© State of Queensland, 2015.

The Queensland Government supports and encourages the dissemination and exchange of its information. The copyright in this publication is licensed under a Creative Commons Attribution 3.0 Australia (CC BY) licence.



Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms.

You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

For more information on this licence, visit <http://creativecommons.org/licenses/by/3.0/au/deed.en>

If you need to access this document in a language other than English, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone Library Services on +61 7 3170 5470.

This publication can be made available in an alternative format (e.g. large print or audiotape) on request for people with vision impairment; phone +61 7 3170 5470 or email <[library@ehp.qld.gov.au](mailto:library@ehp.qld.gov.au)>.

February 2015

# Contents

1	Introduction .....	1
2	Project description .....	2
2.1	Location .....	4
2.2	Project construction and infrastructure .....	4
2.3	Tenures and tenements .....	5
2.4	Resource base and mine life .....	5
2.5	Mining methods and equipment.....	5
2.6	Creek diversions and drainage re-alignments .....	6
2.7	Mine sequencing.....	8
2.8	Waste management.....	8
2.8.1	Excavated waste rock .....	8
2.8.2	Tailings and coal rejects .....	8
2.8.3	General waste .....	9
2.8.4	Regulated waste .....	9
2.8.5	Mine water management, supply and storage.....	9
2.8.6	Sewage treatment.....	10
2.9	Rehabilitation and decommissioning .....	10
2.9.1	Final voids.....	10
2.10	Transport.....	11
2.11	Energy.....	11
2.12	Telecommunications .....	12
2.13	Workforce and accommodation .....	12
3	The EIS process .....	13
3.1	Timeline of the EIS process .....	13
3.2	Approvals .....	15
3.2.1	<i>Mineral Resources Act 1989</i> .....	17
3.2.2	<i>Environmental Protection Act 1994</i> .....	17
3.2.3	<i>Water Act 2000</i> .....	17
3.2.4	<i>Aboriginal Cultural Heritage Act 2003</i> .....	18
3.2.5	<i>Nature Conservation Act 1992</i> .....	18
3.2.6	<i>Queensland Heritage Act 1992</i> .....	18
3.2.7	<i>Transport Infrastructure Act 1994</i> .....	19
3.3	Consultation program .....	19
3.3.1	Public consultation .....	19
3.3.2	Advisory bodies.....	20
3.3.3	Public notification .....	21
3.4	Matters considered in the EIS assessment report.....	22
3.4.1	The final TOR.....	22
3.4.2	The submitted EIS .....	22
3.4.3	Properly made submissions.....	22

3.4.4	The standard criteria .....	23
3.4.5	<i>Environment Protection and Biodiversity Conservation Act 1999</i> .....	23
4	Adequacy of the EIS .....	24
4.1	Introduction .....	24
4.2	Project need and alternatives .....	24
4.3	Impact assessment approach.....	25
4.4	Regulatory approvals.....	25
4.5	Consultation .....	25
4.6	Description of the project .....	25
4.7	Climate .....	25
4.7.1	Existing values .....	26
4.7.2	Impacts .....	26
4.7.3	Avoidance, mitigation and management measures.....	28
4.7.4	Outstanding issues .....	29
4.7.5	Conclusions and recommendations.....	29
4.8	Air.....	29
4.8.1	Existing values .....	29
4.8.2	Impacts .....	29
4.8.3	Avoidance, mitigation and management measures.....	30
4.8.4	Outstanding issues .....	31
4.8.5	Conclusions and recommendations.....	31
4.9	Greenhouse gas emissions .....	32
4.9.1	Existing values .....	32
4.9.2	Impacts .....	32
4.9.3	Avoidance, mitigation and management measures.....	33
4.9.4	Outstanding issues .....	33
4.9.5	Conclusions and recommendations.....	34
4.10	Land .....	34
4.10.1	Existing values .....	34
4.10.2	Impacts .....	35
4.10.3	Outstanding issues .....	36
4.10.4	Conclusions and recommendations.....	36
4.10.5	Resource utilisation.....	37
4.11	Waste management.....	37
4.11.1	Waste rock characterisation and quantification .....	37
4.11.2	Mine waste inventory .....	37
4.11.3	Impacts .....	37
4.11.4	Avoidance, mitigation and management measures.....	38
4.11.5	Outstanding issues .....	38
4.11.6	Conclusions and recommendations.....	38
4.12	Surface water.....	39

4.12.1	Hydrology and environmental values.....	39
4.12.2	Impacts on surface water resources.....	40
4.12.3	Impacts on surface water quality .....	41
4.12.4	Impacts on hydrological and hydraulic conditions .....	42
4.12.5	Impacts on ecological conditions .....	43
4.12.6	Impact monitoring and management .....	44
4.12.7	Conclusions and recommendations.....	44
4.13	Groundwater .....	45
4.13.1	Existing values .....	45
4.13.2	Impacts on groundwater flows and quality.....	46
4.13.3	Impacts on groundwater dependent ecosystems .....	48
4.13.4	Impacts on other water users .....	49
4.13.5	Impact monitoring and management .....	49
4.13.6	Adequacy of the EIS and outstanding matters .....	50
4.13.7	Conclusions and recommendations.....	50
4.14	Ecology .....	50
4.14.1	Biodiversity values .....	50
4.14.2	Impacts .....	56
4.14.3	Avoidance, mitigation and management measures.....	58
4.14.4	Offsets.....	59
4.14.5	Outstanding issues .....	61
4.14.6	Conclusions and recommendations.....	63
4.15	Transport.....	64
4.15.1	Existing values .....	64
4.15.2	Impacts .....	64
4.15.3	Avoidance, mitigation and management measures.....	66
4.15.4	Outstanding issues .....	67
4.15.5	Conclusions and recommendations.....	67
4.16	Noise and vibration .....	67
4.16.1	Existing values .....	67
4.16.2	Impacts .....	67
4.16.3	Avoidance, mitigation and management measures.....	69
4.16.4	Outstanding issues .....	69
4.16.5	Conclusions and recommendations.....	69
4.17	Economics .....	70
4.17.1	Existing values .....	70
4.17.2	Impacts .....	71
4.17.3	Avoidance, mitigation and management measures.....	71
4.17.4	Outstanding issues .....	72
4.17.5	Conclusions and recommendations.....	72
4.18	Social .....	72

4.18.1	Existing values .....	72
4.18.2	Impacts .....	74
4.18.3	Avoidance, mitigation and management measures.....	75
4.18.4	Outstanding issues .....	78
4.18.5	Conclusions and recommendations.....	78
4.19	Cultural heritage.....	79
4.19.1	Indigenous cultural heritage.....	79
4.19.2	Non-Indigenous cultural heritage.....	79
4.19.3	Outstanding issues .....	80
4.19.4	Conclusions and recommendations.....	80
4.20	Landscapes and visual amenity.....	80
4.20.1	Existing values .....	80
4.20.2	Impacts .....	81
4.20.3	Avoidance, mitigation and management measures.....	82
4.20.4	Outstanding issues .....	82
4.20.5	Conclusions and recommendations.....	82
4.21	Hazard and risk.....	83
4.21.1	Existing values .....	83
4.21.2	Impacts .....	83
4.21.3	Avoidance, mitigation and management measures.....	84
4.21.4	Outstanding issues .....	85
4.21.5	Conclusions and recommendations.....	85
4.22	Health and safety.....	86
4.22.1	Existing values .....	86
4.22.2	Impacts .....	86
4.22.3	Avoidance, mitigation and management measures.....	86
4.22.4	Outstanding issues .....	88
4.22.5	Conclusions and recommendations.....	88
4.23	Rehabilitation and decommissioning .....	89
4.23.1	Approach.....	89
4.23.2	Impacts .....	89
4.23.3	Mitigation and management measures.....	90
4.23.4	Outstanding issues .....	91
4.23.5	Conclusions and recommendations.....	91
5	Matters of national environmental significance .....	92
5.1	Introduction .....	92
5.2	Controlling provisions .....	92
5.2.1	Water trigger .....	93
5.3	Assessment process.....	93
5.4	Description of the proposed action .....	93
5.5	Places affected by the proposed action.....	94

5.6	Assessment method .....	94
5.7	Mitigation measures.....	95
5.7.1	Threatened ecological community and threatened species habitat .....	95
5.7.2	World heritage properties (sections 12 and 15A); National heritage places (sections 15B and 15C); and Great barrier reef marine park (sections 24B and 24C) .....	96
5.7.3	Water resources.....	97
5.8	Estimates of disturbance and impacts.....	97
5.8.1	Listed threatened ecological communities.....	97
5.8.2	Listed threatened flora species.....	98
5.8.3	Listed threatened fauna species.....	99
5.8.4	Migratory species.....	101
5.8.5	World heritage properties (sections 12 and 15A); National heritage places (sections 15B and 15C); and Great Barrier Reef Marine Park (sections 24B and 24C).....	102
5.8.6	Water resources (sections 24D and 24E).....	103
5.9	Major issues raised.....	105
5.10	Conclusions and recommendations.....	105
6	Adequacy of the environmental management plan.....	106
7	Outstanding matters .....	107
8	Recommended conditions of approval.....	111
8.1	<i>Environmental Protection Act 1994</i> .....	111
8.2	<i>Nature Conservation Act 1992</i> .....	111
8.3	Environmental offsets .....	111
8.4	<i>Fisheries Act 1994</i> .....	112
8.5	<i>Transport Infrastructure Act 1994</i> .....	112
9	Suitability of the project .....	113
10	Report certification.....	116
11	Approved by.....	116
	List of figures.....	117
	List of acronyms and abbreviations .....	121
Appendix A	Recommended environmental authority conditions under the EP Act.....	124
Appendix B	MNES assessment report – EPBC Act.....	147
	Water trigger.....	147
	Estimates of disturbance and impacts.....	147
World Heritage properties (sections 12 and 15A).....		151
Great Barrier Reef World Heritage Area .....		151
Description.....		151
Impacts of proposed action .....		151
Avoidance and mitigation measures .....		151
Residual impact.....		152
Cumulative impact.....		152
Consideration of conservation advice/plans.....		152
Conclusion.....		153

National Heritage places (sections 15B and 15C) – Great Barrier Reef .....	153
Description.....	153
Potential impacts .....	153
Conclusion.....	153
Great Barrier Reef Marine Park (sections 24B and 24C) .....	153
Description.....	153
Potential impacts .....	153
Conclusion.....	153
Listed threatened species and communities (sections 18 and 18A) .....	154
Listed threatened ecological communities .....	154
Brigalow ( <i>Acacia harpophylla</i> dominant and co-dominant).....	154
EPBC Act listing status: endangered .....	154
Description.....	154
Distribution.....	154
Survey requirements and survey effort .....	154
Occurrence within project area.....	155
Impacts of the proposed action .....	155
Proposed mitigation and management measures.....	155
Residual impact .....	155
Cumulative impact .....	155
Offsets .....	155
Consideration of Plans/Agreements/Conservation Advice.....	156
Conclusion.....	157
Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin .....	157
EPBC Act listing status: endangered .....	157
Description.....	157
Distribution.....	157
Survey requirements and survey effort .....	158
Consideration of Plans/Agreements/Conservation Advice.....	159
Conclusion.....	160
Coolibah-Black Box woodlands of the Darling Riverine Plains and Brigalow Belt South Bioregions .....	160
EPBC Act listing status: endangered .....	160
Description.....	160
Distribution.....	160
Survey requirements and survey effort .....	161
Consideration of Plans/Agreements/Conservation Advice.....	162
Conclusion.....	163
Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions .....	164
EPBC Act status: endangered.....	164
Description.....	164
Distribution.....	164



Survey requirements and survey effort .....	164
Occurrence within the project area.....	164
Impacts of the proposed action .....	165
Avoidance and mitigation measures .....	165
Residual impact .....	165
Cumulative impact .....	165
Offsets .....	165
Consideration of Plans/Agreements/Conservation Advice.....	165
Conclusion .....	166
A tufted grass <i>Aristida annua</i> .....	166
EPBC Act Status: vulnerable.....	166
Description.....	166
Distribution.....	166
Survey requirements and survey effort .....	167
Occurrence within the project area.....	167
Impacts of the proposed action .....	167
Avoidance and mitigation measures .....	167
Residual impact .....	167
Cumulative impact .....	167
Offset .....	167
Consideration of Plans/Agreements/Conservation Advices.....	167
Conclusion .....	168
King blue-grass ( <i>Dichanthium queenslandicum</i> ) .....	168
EPBC Act Status: endangered .....	168
Distribution.....	168
Survey requirements and survey effort .....	168
Occurrence within the project area.....	169
Impacts of the proposed action .....	169
Avoidance and mitigation measures .....	169
Residual impact .....	169
Cumulative impacts .....	169
Offsets .....	169
Consideration of Plans/Agreements/Conservation Advice.....	169
Conclusion .....	170
Bluegrass ( <i>Dichanthium setosum</i> ) .....	170
EPBC Act Status: vulnerable.....	170
Description.....	170
Survey requirements and survey effort .....	171
Occurrence within the project area.....	171
Impacts of the proposed action .....	171
Avoidance and Mitigation Measures .....	171

Residual impacts .....	171
Cumulative impacts .....	171
Offsets .....	172
Consideration of Plans/Agreements/Conservation Advices .....	172
Conclusion .....	172
Black-breasted button-quail ( <i>Turnix melanogaster</i> ) .....	173
EPBC Act listing: vulnerable .....	173
Description .....	173
Distribution .....	173
Survey requirements and survey effort .....	173
Occurrence within project area .....	173
Impacts of the proposed action .....	173
Avoidance and mitigation measures .....	174
Residual impact .....	174
Cumulative impacts .....	174
Offsets .....	174
Consideration of Plans/Agreements/Conservation Advices .....	174
Conclusion .....	175
Australian painted snipe ( <i>Rostratula australis</i> ) .....	176
EPBC Act Status: endangered .....	176
Description .....	176
Distribution .....	176
Survey requirement and survey effort .....	176
Occurrence within project area .....	176
Impacts of the proposed action .....	176
Avoidance and mitigation measures .....	177
Residual impact .....	177
Cumulative impacts .....	177
Offsets .....	177
Consideration of Plans/ Agreement/Conservation Advice .....	177
Conservation advice .....	177
Conclusion .....	178
Squatter pigeon (southern) <i>Geophaps scripta scripta</i> .....	179
EPBC Act Status: vulnerable .....	179
Description .....	179
Distribution .....	179
Survey requirements and survey effort .....	179
Occurrence within project area .....	180
Potential impacts of proposed action .....	180
Avoidance and mitigation measures .....	181
Residual impact .....	181

Cumulative impacts .....	181
Offsets .....	181
Consideration of Plans/Agreement/Conservation advice.....	181
Conclusion.....	182
Ornamental snake ( <i>Denisonia maculata</i> ).....	182
EPBC Act Status: vulnerable.....	182
Description.....	182
Distribution.....	183
Survey requirements and survey effort .....	183
Occurrence within the project area.....	183
Potential impacts of the proposed action .....	183
Avoidance and mitigation measures .....	184
Residual impact.....	184
Cumulative impact.....	184
Offsets .....	184
Consideration of Plans/Agreements/Conservation Advice.....	184
Conclusion.....	185
South-eastern long-eared bat ( <i>Nyctophilus corbeni</i> ) .....	185
EPBC Act Status: vulnerable.....	185
Description.....	185
Distribution.....	186
Survey requirements and survey effort .....	186
Occurrence within project area.....	186
Potential impacts of proposed action .....	187
Avoidance and mitigation measures .....	187
Residual impact.....	187
Cumulative impacts .....	187
Offsets .....	187
Consideration of Plans/Agreements/Conservation Advice.....	187
Conclusion.....	187
Yakka skink ( <i>Egernia rugosa</i> ) .....	187
EPBC Act listing status: vulnerable .....	187
Description.....	187
Distribution.....	188
Survey requirements and survey effort .....	188
Occurrence within project area.....	188
Potential impacts of proposed action .....	188
Avoidance and mitigation measures .....	188
Residual impact.....	189
Cumulative impacts .....	189
Offsets .....	189

Consideration of Plans/Agreements/Conservation Advice.....	189
Conclusion.....	189
Collared delma ( <i>Delma torquata</i> ) .....	190
EPBC Act listing status: vulnerable .....	190
Description.....	190
Distribution and habitat.....	190
Survey requirements and survey effort .....	190
EPBC Act survey requirements/techniques .....	190
Occurrence within project area.....	191
Avoidance and mitigation measures .....	191
Residual impact.....	191
Cumulative impacts .....	191
Offsets .....	191
Consideration of Plans/Agreements/Conservation Advice.....	191
Conclusion.....	192
Listed migratory species (sections 20 & 20A) .....	192
Survey requirements and survey effort .....	193
EPBC Act survey requirements/techniques .....	193
Occurrence within project area.....	193
Impacts of the proposed action .....	193
Avoidance and mitigation measures .....	194
Residual impact.....	194
Cumulative impacts .....	194
Offsets .....	194
Conclusion.....	195
Water resources (sections 24D and 24E).....	195
Conclusions .....	196
Appendix C   Transport, main roads and maritime safety requirements .....	197

# 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 Rolleston Coal Expansion Project (the project) proposed by Glencore Coal Queensland Pty Ltd (the proponent, formally Xstrata Coal Queensland Pty Ltd). Glencore Coal Queensland Pty Ltd is the majority participant and manager of the Rolleston Coal Joint Venture whose joint venture partners comprise Glencore Coal Queensland Pty Ltd (75%), Sumish Coal Australia Pty Ltd (12.5%), and Itochu Coal Resources Australia RPW Pty Ltd (12.5 %). During the preparation of the EIS, Xstrata plc (the parent company of Xstrata Coal Queensland (XCQ)) merged with Glencore plc. As a result of the merger, XCQ changed its name to Glencore Coal Queensland Pty Ltd. For the purposes of the EIS and this assessment report, reference to XCQ remains. However, all future correspondence associated with the project post completion of the EIS assessment report, will refer to Glencore Coal Queensland Pty Ltd.

The proponent is seeking approval to expand its existing open-cut thermal coal mine project, approximately 16 kilometres (km) west of the town of Rolleston in central Queensland, within the Central Highlands Regional Council (CHRC) area (Figure 1).

The EIS process was initiated by an amendment application made by the proponent on 14 October 2009 for an Environmental Authority (EA) (Mining Activities) for a Non-code Compliant Level 1 mining project. On 27 October 2009, the then Department of Environment and Resource Management (DERM), now the Department of Environment and Heritage Protection (EHP) decided that the application would be assessed as a Non-code Compliant Level 1 mining project and an EIS would be required. On 11 August 2011, the proponent submitted draft terms of reference (TOR) for the project which commenced the EIS process. The final TOR was approved on 16 December 2011.

On 13 May 2011, the project was referred to the Australian Government to determine whether the proposed action (i.e. the project) would need assessment and approval under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). On 21 June 2011, the then Commonwealth Department of Sustainability, Environment, Water, Population and Communities (SEWPAC), now the Department of the Environment (DOE), decided (EPBC Referral Number 2011/5965) that the proposed action was a controlled action under the EPBC Act due to the potential impacts on multiple Matters of National Environmental Significance (MNES).

Requests to vary the proposed action were made to DOE on 22 August 2011 and 2 September 2012. The first variation was made to include MLA70458. The second variation was made to align the project's proposed footprint with that of the approved Rolleston Coal Mine (EPBC 2001/497 and EPBC 2009/5175) and to include an area of the proposed off-lease re-alignment option of Springwood Road. The variations were approved on 4 November 2013 and 12 November 2013 respectively. On 17 October 2013, the Commonwealth also decided that as impact on water resources was also a controlling provision for the specified action under the EPBC Act.

This assessment report, prepared by EHP as per the Assessment Bilateral Agreement between the Queensland and Commonwealth governments, considers the significance of impacts of the action on the controlling provisions. A copy of this assessment report will be given to the Commonwealth Environment for the Minister, who will decide whether to approve or refuse the controlled action under Part 9 of the EPBC Act.

EHP (as the administering authority) has coordinated the EIS process for the project under the EP Act. This assessment report has been prepared pursuant to sections 58 and 59 of the EP Act. Section 58 of the EP Act lists the criteria that EHP must consider when preparing an EIS assessment report and section 59 states that the content of the report must:

- address the adequacy of the EIS in addressing the final terms of reference
- address the adequacy of the environmental management plan (EM plan)
- make recommendations about the suitability of the project
- recommend any conditions on which any approval required for the project may be given
- contain another matter prescribed under a regulation.

The purpose of this report is to:

- provide an assessment of the project EIS documentation to complete the EIS process under section 60 of the EP Act
- provide information for assessment of the project under the Assessment Bilateral Agreement for the purposes of the EPBC Act.

This report summarises the key issues associated with the potentially adverse and beneficial environmental, economic and social impacts of the project. It discusses the management, monitoring, planning and other measures proposed to minimise any adverse environmental impacts of the project. It notes those issues of particular concern that were either unresolved or require specific conditions in order for the project to proceed.

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

## 2 Project description

The Rolleston Coal Mine was approved in 2005, allowing production up to 14 million tonnes per year (Mt/yr) run of mine (ROM) coal to produce an equivalent tonnage of thermal coal for export. The existing mine operates over two Mining Leases (ML): ML70307 (4864 hectares (ha)) and ML70418 (163ha). Mining commenced in 2005.

Approval of the project would expand the existing mine by adding the western Mining Lease Application (MLA) 70415 (6271ha) and the southern MLA70416 (2624ha) areas. MLA70458 (3589ha) would also form part of the project for the purpose of constructing a water storage irrigation dam and a creek diversion between Meteor and Sandy Creeks and containing the flood afflux from the Meteor Creek flood levee (Figure 2). The additional mining areas would allow mine production to increase by 5Mt/yr to a maximum 19Mt ROM coal. The proponent plans to commence expansion of open-cut and associated mine construction development activities in 2015, and would continue for approximately 23 years. The life of the Rolleston Coal Mine operation would be extended by approximately 30 years. An estimated 280Mt of ROM coal would be produced over the life of the project. This includes the existing mine and the proposed expansion component.

The main elements of the expansion project would include:

- extension of the existing open-cut mining areas within ML70307
- adding new open-cut mining areas within MLA70415 and MLA70416, and MLA70458 for the construction of a water storage dam and permanent creek diversion between Meteor and Sandy creeks
- increasing production tonnage by 5Mt/yr ROM coal above the current approved 14Mt/yr ROM coal, up to 19Mt/yr ROM coal. Total production over the life of the project is estimated at approximately 280Mt ROM coal (this production tonnage figure includes the existing mine and expansion project)
- a Marion 8750 dragline, P&H4100 XPC electric rope shovel and additional support equipment to operate within the new mining areas
- operating hours are scheduled at 24 hours per day, 7 days per week
- continued employment of the current workforce of up to 1030 mine workers plus an additional 170 employee as a the direct result of the proposed expansion, decreasing towards the end of the mine life
- increasing the capacity of the existing accommodation village by 100 rooms. Total capacity would be 800 rooms
- new mining areas, including:
  - ML70307 consists of the proposed:
    - Meteor South (A) Pit (extension)
    - Meteor South (B) Pit (extension)
    - Gibbs Gully Pit (extension)
    - W1 Pit (extension)
  - MLA70415 consists of the proposed:
    - Gibbs Gully Pit (extension)
    - W2 Pit
    - W3 Pit
    - W4 Pit
  - ML70416 consists of the proposed:
    - Meteor South (A) Pit (extension)
    - Meteor South (B) Pit (extension)
- new pit areas would be predominately multi-seam strip mining operations approximately 50 – 70 metre (m) wide
- utilisation of existing infrastructure where feasible. The existing mine infrastructure area (MIA) would require the following additional infrastructure and or upgrades:
  - two bay heavy vehicle workshop extension
  - fuel and lube facility upgrade
  - office expansion
  - coal handling facility (CHF) upgrade

- train load out (TLO) facility upgrade
- explosives and ammonium nitrate (AN) storage
- ROM coal stockpiles
- a new mine service area (MSA) would be constructed on MLA70415 to provide maintenance services for mining operations, including:
  - a two bay workshop for CAT 795Fs
  - hardstand area
  - a 12 person office and meal facility
  - fuel and lubrication storage (200,000 litres and 70,000 litres respectively)
  - light vehicle and heavy vehicle refuelling/parking
  - vehicle set down area (5 x CAT 795Fs)
  - services (e.g. water, power, communications, sewage)
- development of new haul roads through MLA70415 and MLA70416
- development of an MSA access road through MLA70415
- development of a blast compound for western pits in MLA70415, off the haul route south of Gibbs Gully Pit and W3 Pit
- water infrastructure would be constructed consisting of:
  - levees:
    - Meteor Creek Levee — to protect Meteor South Pits A and B from flooding from Sandy and Meteor Creeks
    - Gibbs Gully Pit Protection Levee — to protect Gibbs Gully Pit from flooding from Gibbs Gully
    - West 1 Pit Protection Levee — to protect West 1 Pit from flooding from Bootes Creek
    - West 2 Flood Protection Levee — to protect West 2 Pit from flooding from Bootes Creek
    - West 3 Pit Protection Levees (1, 2 and 4) — to protect West 3 Pit from flooding from Bootes Creek, Patons Spring Gully and Gibbs Gully
    - West 4 Flood Protection Levee 1 and 2 — to protect West 1 Pit from flooding from Bootes Creek and Patons Spring Gully
    - Spring Creek Overflow Levee — to protect Spring Creek West Pit from flooding from Bootes and Spring Creeks
  - creek diversions:
    - Sandy Creek diversion channel — to divert flows to Meteor Creek to the south-east of Meteor Creek Levee
    - Bootes Creek diversion channel — to redirect flows to mine Gibb's Gully Pit, West 1 Pit and West 2 Pit
  - drainage re-alignments:
    - Gibbs Gully drainage realignment — to divert flows from undisturbed catchments around Gibbs Gully Pit
    - Paton's Spring Gully drainage realignment — to divert flows from undisturbed catchments around West 3 and West 4 Pits
  - dams to allow water from mining operations to be stored, reused and released under controlled conditions:
    - Western Release Dam
    - Water Storage Dam 2
    - W2 Pit Dam
    - W3 Pit Dam
  - dewatering:
    - additional highwall pumps to allow dewatering of pits
  - pipelines:
    - extension of the existing mine water management system to connect new dams and allow water transfers across the site
  - potable water supply:
    - continued potable water supply from Naroo Dam and potential supplementary supply from the advanced dewatering system within the future active mining areas

- minor drainage infrastructure:
  - sediment dams, bunds and drains to capture and treat run-off from disturbed areas
- relocation of an Ergon Energy power line to southern side of Meteor Creek and a new MSA 66 kilovolt (kv) electricity infrastructure line
- realignment of Springwood Road and Mt Kelman Access Road reserve
- utilising the existing Rolleston Coal Mine Access Road which connects to the Dawson Highway
- new microwave link between the MSA and MIA
- progressive rehabilitation of disturbed areas during operations until final rehabilitation at the mine decommissioning stage
- a total project area of approximately 12758ha which includes the existing MLs and proposed MLAs areas
- a full production workforce of approximately 1030 employees.

## 2.1 Location

The project is located in the Bowen Basin, approximately 275km west of Gladstone, 16km west of the town of Rolleston and 58km south-east of Springsure and wholly within the CHRC local government area (Figure 1).

## 2.2 Project construction and infrastructure

The EIS considered the various project activities that would be required to support mining and mine infrastructure during the construction stage of the project, including civil works, building and plant erection and installation, commissioning and testing and site demobilisation. Existing infrastructure located on the Rolleston Coal Mine would provide the majority of services to support the mine's operation, however some specialist equipment may be required, for example (e.g.) P&H4100 XPC electric rope shovel and mobile equipment, through construction period. The EIS adequately described the proposed activities, infrastructure to be built and key stages over the life of the project. The EIS stated that mining is not proposed within the full extent of the site with direct impacts constrained to a disturbance footprint area of approximately 5649ha.

The current land use of the project site is low intensity cattle grazing and some cropping. Some farm related infrastructure such as cattle feeders and storage sheds would need to be removed. Civil and earthworks would involve clearing vegetation for infrastructure construction. Further site clearance would include removal of vegetation, topsoil stripping and storage, bulk earthworks and some temporary drainage works.

The new MSA is intended to provide additional maintenance and support services for mining operations on MLA70415.

Construction and operation of the project requires the realignment of two public roads – Springwood Road and Mount Kelman Access Road. Springwood Road is a formed gravel road whilst Mount Kelman Access Road is unconstructed gazetted road. The reserves of both roads are dedicated 'land in road' and administered by the Department of Natural Resources and Mines (DNRM). Administration of formed, local roads is undertaken by CHRC. Two options for the realignment of the Springwood Road were assessed in the EIS with the proponent nominating its preferred option for the re-alignment to occur within an area of MLA70416 and MLA70458.

Mount Kelman Access Road traverses the western portion of MLA70415. The realignment would maintain future public access to allow expansion of the project into those areas covered by the road footprint.

According to the EIS the final alignments would be developed in consultation with CHRC, affected landholders, Department of Transport and Main Roads (DTMR), DNRM and the Queensland Police Service. The realignments are further discussed in section 4.15, Transport of this EIS assessment report.

Water infrastructure for the existing mine includes both a raw water and potable water supply. The existing water supply infrastructure would continue to service the expansion operations, with an extension of the service to the MSA on ML70415. Additional sewage facilities would also be required to service the MSA. Potable water for the existing mine is extracted from Naroo Dam and is treated using a purification system prior to consumption. Stormwater drainage infrastructure including, sediment dams, bunds and drains would be constructed to appropriately manage runoff from disturbed areas entering the active pit system. Overland flow from disturbed areas would be managed and separated from flows across undisturbed areas to mitigate the potential impacts of on downstream water quality, environmental values and uses. Planning for the project's water infrastructure needs was undertaken and an integrated mine and water management plan needs to be developed. The creek diversions and drainage realignments were included in the water management plan with the preferred infrastructure option selected to have the least environmental and operational impacts.

Refuelling, hardstand and wash bay area design would direct any contaminated surface water runoff to sumps for the recovery and treatment of waste materials.



## 2.3 Tenures and tenements

The proposed mine site has been historically used mainly for low intensity grazing purposes and some cropping.

The EIS provided real property descriptions and cadastral boundaries of properties underlying the existing mine operation on ML70307 (4864ha) and rail loop and load-out area on ML70418 (163ha) and application for three additional mining leases on MLA70415 (6271ha), MLA70416 (2624ha) and MLA70458 (3589ha). All tenements (Figure 3) are held by the XCQ, ICRA Rolleston Pty Ltd and Sumisho Coal Australia Pty Ltd.

The EIS stated that one exploration permit for petroleum (EPP756), held by OME Resources Pty Ltd (a subsidiary of Pure Energy) overlies the area in common with MLA70458. Provisions under the *Mineral Resources Act 1989* (MR Act) require that the ML applicant make reasonable attempts to consult with the petroleum tenement holders and enter into a coordination arrangement that would facilitate the coordinated future development of both coal and petroleum resources. The EIS stated that the mining activities proposed by XCQ in this common area are unlikely to preclude the holder of the EPP from being to undertake an authorised activity.

The EIS stated that if the petroleum tenement was granted that the proponent would negotiate appropriate access and other activity agreements with the relevant petroleum tenement holders under the MR Act. However the EIS did not provide an update of the status of those negotiations.

The EIS stated that mining tenure over the MLA areas would be sought under provisions of the MR Act.

## 2.4 Resource base and mine life

The EIS stated that the coal resource exists in the upper part of the Blackwater Group sequence. The projects mineral resources and ore reserves were estimated and recorded in accordance with the Joint Ore Reserves Committee (JORC) Code 2012, and the Australian Guidelines for the Estimating and Reporting of Inventory Coal, Coal Resources and Coal Reserves. A reserve of 280Mt of ROM coal is estimated to be extracted over the project's planned operation life of 23 years (out to approximately 2045). This ROM coal tonnage includes the existing mine and the expansion project. Apart from the identified coal resources in the Blackwater Group sequence, no other mineral or energy resources of commercial value were identified on the project site.

The EIS described in descending stratigraphic order, four coal seams: A, including A1 and A2, B, C and D within the project site. According to the EIS the average coal seam dips range from 2° to 3° and increase to 5° in some localised areas, which makes them ideal for open-cut mining. Coal seam thickness ranges from 0.5m to 5m with the wider D seam (averaging 4.4m thick) making up approximately 60% of the estimated total coal resource. The EIS described the key quality features of the coal resource as:

- low ash, precluding the need for washing
- moderate sulphur
- high moisture and moderate energy levels.

Coal seam quality parameters are described as being relatively consistent throughout each seam. This can be attributed to the general lack of seam splitting and the consistency of the coal seam lithotypes across the deposit profile.

## 2.5 Mining methods and equipment

The proponent has approval to continue open-cut mining operations within ML70307 to produce up to 14Mt/yr of ROM coal. The mine plan proposes a continuation of mining on the existing lease in conjunction with the progressive expansion of mining activities into MLA's 70415 and 70416 up to the proposed maximum 19Mt/yr of ROM coal.

Mine operations would be continual (365 days per year and 24 hours per day) employing an estimated 1030 people at full production. All mining would be open-cut by drill and blast methods with a fleet of excavators and trucks to transfer waste rock to dumps and coal to the MIA for processing along dedicated haul roads.

The mine plan for the expansion would use an existing and additional dragline, plus additional trucks and dozers to accommodate and manage additional pre-strip, post strip and coal volumes. The existing mine operation equipment fleet includes two BE 2570W draglines operating on a seven day roster stripping overburden. The mine plan expansion and operation would require one additional Marion 8750 dragline and P&H 4100 XPC shovel and earthmoving equipment including additional track excavators and shovels, diesel powered haul dump trucks, water carriers, service and maintenance support vehicles, track and wheel dozers, graders, front end loaders, miscellaneous ancillary vehicles and drill equipment, light vehicles and buses.

Earth moving equipment would excavate areas for the open-cut pits, spoil dumps and internal transport corridors. Subsequent stages of the construction program would involve the development of remaining infrastructure including water infrastructure, expanded accommodation village, roads and other associated infrastructure.

As with the existing operation, the mining of new pits would be by open-cut methods. The mining strips would be generally 50-70m wide up to a maximum dragline depth of 45m.

Vegetation clearing and stripping of up to 200mm of topsoil would be undertaken before strip works. According to the EIS rehabilitation would occur in three stages. Initial phase when disturbance would be greater than rehabilitation, then steady state, then third stage when less disturbance than rehabilitation occurs. According to the EIS the 'steady state' option is likely to be achieved during the first two years. The majority of the recovered topsoil would be placed directly in reshaped spoil areas undergoing rehabilitation or would be placed and stored in separate stockpiles, shaped to reduce erosion, for later use in rehabilitation works.

The EIS stated that the majority pre-strip and post-strip spoil and waste would be dumped in-pit to minimise the size of final voids.

The staged works would generally follow the current Rolleston Coal Mine activity sequencing as follows:

- construction of haul roads and water management structures, including mine affected water dams, gully drainage realignments and levees
- removal of vegetation
- collection of topsoil and placement in available rehabilitation area or placed in stockpiles
- removal of Quaternary/alluvium where present (MLA70416) by using trucks and shovels, scapers and dozer equipment
- development of a blast pad
- drilling and loading explosives
- overburden removal using the truck and shovel fleet or dragline depending on depth
- recovery of target coal seams, with interburden removed by excavators, trucks, dozer or dragline depending on depth
- ROM coal would be hauled back to the coal handling facility (CHF), where it would be crushed and loaded onto rail wagons for export
- mining operations, including rehabilitation would continue until mine closure, currently scheduled for 2045.

Blasting would be conducted within relevant Queensland guidelines and the blasting procedures would be progressively refined as mining in the pits advanced.

The MIA would process up to 19Mt/yr of ROM coal to produce an average 19Mt/yr of product coal. Overburden and interburden would be placed in out-of-pit and in-pit spoil dumps. The coal will be processed through the existing CHF located on ML70307 and would involve crushing the coal to a nominal size of <50mm, without the need for washing before stockpiling and load-out through the existing rail mine load-out facility. Product coal would be conveyed from the crushing plant to a product stockpile with a capacity of 800,000 tonnes (t). An additional 200,000t stockpile would be available nearby or as a temporary measure product coal would be placed within pit areas, if required.

## 2.6 Creek diversions and drainage re-alignments

The project site is located within the catchment of Meteor Creek, a tributary of the Comet River within the Fitzroy River Basin. According to the EIS, three watercourses — Meteor Creek, Sandy Creek and Bootes Creek — as well as three drainage features — Gibbs Gully, Spring Creek and Paton's Spring Gully flow generally in a north-east direction through the project site. Meteor, Sandy and Bootes creeks are all defined as a watercourse under the *Water Act 2000* (Water Act). These surface water features posed a significant surface constraint for mining activities on ML70307 and 70418 and MLAs 70415, 70416 and 70458. The EIS considered three options and concluded that two creek diversions and two gully re-alignments would be required to effectively manage surface water flows through the site:

- the proposed creek diversions include:
  - Sandy Creek diversion channel — to divert flows to Meteor Creek to the South East of Meteor Creek Levee
  - Bootes Creek diversion channel (Stage 1 and 2) — to redirect flows to mine Gibb's Gully Pit, West 1 Pit and West 2 Pit

- the drainage realignments include:
  - Gibbs Gully drainage realignment (Stage 1 and 2) — to divert flows from undisturbed catchments around Gibbs Gully Pit
  - Paton's Spring Gully drainage realignment (Stage 1 and 2) — to divert flows from undisturbed catchments around West 3 and West 4 Pits.

According to the EIS, the creek diversions and drainage re-alignments would divert surface water flows to protect existing and proposed mining operations and to allow full exploitation of all coal resources. The EIS stated that the Sandy Creek diversion channel would direct flows towards Meteor Creek to the south-east of the Meteor Creek Levee. Modelling indicated the diversion would cause an increase in the flow velocities, shear stresses and stream power and may cause some downstream erosion impacts to Meteor Creek. The EIS proposed bank protection, revegetation and stabilisation works to mitigate downstream impacts.

The EIS described the mining sequence and included the temporary and permanent creek diversions and drainage re-alignments. The mining sequence is described further in section 2.7 of this EIS assessment report.

The EIS stated that the diversion of the creeks, drainage re-alignments and levee construction would occur in stages. According to the EIS the final diversion, drainage re-alignment and associated water infrastructure including levees would be designed and constructed to facilitate:

- monitoring the performance and stability of the diversions and re-alignments
- monitoring channel development
- any necessary repairs to the diversions and re-alignments to be made
- establishing vegetation
- the management of erosion and sediment runoff.

According to the EIS, the concept design for the creek diversion was undertaken in accordance with the former DERM's Watercourse Diversions — Central Queensland Mining Industry V5.0 (2011e) and Australian Coal Association Research Program (ACARP) guidelines. Since the development concept design, and advice from DNRM, additional design work for the diversion of Sandy Creek has been undertaken in accordance with Guideline — Works that interfere with water in a watercourse: Watercourse diversions (November 2013, as amended September 2014). The EIS provided further refinement of the concept design and a more detailed functional design was developed. XCQ met with DNRM and EHP on 16 April 2014 to discuss the diversion, and it was confirmed that the detail design of Sandy Creek diversion would be undertaken in accordance with the new DNRM Guideline — Works that interfere with water in a watercourse: watercourse diversions. XCQ has committed that prior to construction, certification of the functional design (and specifically a Design Plan) for the diversion of Sandy Creek would be undertaken by a suitably qualified and experienced person (SQEP) to ensure that the watercourse diversion would achieve the outcomes stated in the guideline. This would occur in accordance with section 20(4) of the Water Act and the DNRM Guideline — Works that interfere with water in a watercourse: watercourse diversions (2014).

XCQ has indicated that they would make application for an approval for the watercourse diversion under the Water Act. However, the Water Act has been amended to allow (section 20(4) Water Act) that this approval may be included under the EA for the project. This arrangement is explained in the DNRM September 2014 guideline. The certified design plan must be submitted to the administering authority prior to the commencement of construction. Following construction, a SQEP must certify that the watercourse diversion has been constructed in accordance with the certified design plan.

The creek diversion functional design will be required to be as undertaken in accordance with the DNRM Guideline — Works that interfere with water in a watercourse: watercourse diversions. The final design must be certified as meeting the following outcomes as the basis for an EA approval:

- watercourse diversions incorporate natural features (including geomorphic and vegetation) present in the landscape and local watercourses
- watercourse diversions maintain the existing hydrologic characteristics of surface water and groundwater systems
- hydraulic characteristics of the watercourse diversion are comparable with other local watercourses and are suitable for the region in which the diversion is located
- watercourse diversions maintain a sediment transport, and water quality regime that allows the diversion to be self-sustaining while minimising any impacts to upstream and downstream reaches
- watercourse diversions and associated structures maintain equilibrium and functionality and are appropriate for all substrate conditions they encounter.

According to the EIS the revegetation objectives and strategies for the creek diversions would be developed to meet the specific operational requirements for each stage of the diversion project. Further details regarding rehabilitation are discussed in section 4.23 of this EIS assessment report.

## 2.7 Mine sequencing

The EIS stated that the mine plan was designed to extract all of the economically viable coal resource with the limits of ML70307 and MLA70415 and part of MLA70416, and that mine sequencing was estimated to continue for approximately 30 years to the estimated end of mine life in 2045.

The EIS presented staged plans consistent with the current operations following a sequence of operations for future open-cut operations in both the current operation on ML70307 and the proposed MLA70415 and MLA70416 Stage 1 (Year 1 – 3), Stage 2 (Year 4 – 6), Stage 3 (Year 7 – 9), Stage 4 (Year 10 – 12), Stage 5 (Year 13 – 18), Stage 6 (Year 19 – 23), Stage 7 (Year 24 – 30). The plans showed the physical extent of excavations, location of stockpiles of topsoil and overburden, proposed progressive backfilling of excavations, water management infrastructure and the area disturbed at each major stage of the project. Infrastructure developments within ML70307 and the proposed MLA70415 and MLA70416 areas would be completely developed prior to the commencement of mining operations and are further discussed in section 2.2 of this EIS assessment report.

## 2.8 Waste management

### 2.8.1 Excavated waste rock

The EIS stated that excavated waste rock (overburden and interburden material extracted to get to the coal) would be made up of sandstone, siltstone, claystone, shale and mudstone rock and it would be disposed of into:

- six out-of-pit dumps located on ML70307, MLA70415 and MLA70416
- the in-pit space behind the mining voids, after the initial box-cut becomes available.

The out-of-pit spoil dumps would be constructed in 15 – 25m lifts to a maximum height of 50m above the natural ground level. Their walls would have a maximum final slope of 10° (i.e. 1V:6H or 18%), although typically they are designed at a 10% slope. According to the EIS the new landform would cover approximately 2784ha (which is 49% of the total disturbance area for the project). The EIS stated that the out-of-pit out dump area is reduced due to synergies with the approved Rolleston Coal Mine (RCM) operations which is contiguous with the project. The EIS stated that the outer slope geometry, adjacent drainage and proposed surface treatment would ensure adequate geotechnical stability and safe accessibility, while minimising the catchment and erosion potential of the slope.

According to the EIS at the end of mine life (Year 2036) approximately 2,626,198,562 bank cubic metre (bcm) (i.e. a cubic metre of rock or material *in situ* before being excavated) of waste rock material would be excavated for the project. When excavated, the waste volume is expected to swell by a factor of 1.1 – 1.3, dependant on material type. Due to that swelling effect, in-pit dumps would be elevated above the natural surface level to a maximum height of 50m above natural surface.

Geochemical characterisation of drill-hole samples presented in the EIS indicated that waste rock generated by the project would generally be non-acid forming (NAF), enriched with some metals, metalloids (in particular selenium), have an alkaline pH, and would be sodic and dispersive with low salinity levels. Mild potential acid forming (PAF) characteristics were identified in drill-hole samples from material adjacent to or between coal seams. The EIS stated that any incorrectly consolidated or designed waste rock stockpiles would have the potential to settle inconsistently or release sediment may lead to the failure of the waste rock containment facility. The EIS concluded that, given the likely high proportion of NAF to PAF (>20:1), there appears to be sufficient acid neutralising capacity (ANC) within the waste material to buffer any potential acid generated, provided appropriate handling or management measures such as mine material segregation, selective placement and engineered covers for acid rock drainage (ARD) or neutral drainage control are effectively implemented.

The EIS noted that overburden and interburden would be sodic and dispersive and be subject to surface crusting and high erosion rates if placed in the surface of spoil dumps or exposed directly to rainfall. Management measures proposed therefore included preferential placement of spoil material with sodic and dispersion potential away from dump surface areas. In particular, the EIS committed that stripped subsoil clay texture or heavier soils, or any dispersive soil, would not be mixed with topsoil for reuse and that dump surface materials would be treated with gypsum or lime if erosion could not be controlled.

On closure the six waste rock dump out-of-pit final landforms would project a maximum of approximately 50m above the natural ground surface and they would be designed to be water shedding, with drainage channels at the base of the dumps directing surface water flows to sediment dams to manage surface runoff.

### 2.8.2 Tailings and coal rejects

No tailings storage facilities or coal reject waste products would be produced by the project as no product coal would be washed through a wash plant.

### **2.8.3 General waste**

The EIS addressed the management of general and recycled waste generated by the project. The EIS noted that the preferred option was for general mine wastes that could not be recycled or reused to be removed from site by a licenced contractor and appropriately disposed of at suitably licenced landfill facilities. The EIS stated that the majority of waste requiring disposal offsite would be taken to the CHRC operated Lochlees landfill near Emerald. The proponent should liaise with CHRC Waste Management Coordinator to ensure waste streams are managed in an efficient and cost effective manner.

### **2.8.4 Regulated waste**

The EIS addressed the management of regulated waste generated by the project. All regulated waste generated by the project would be segregated, stored and managed in accordance with relevant legislation and then collected by an appropriately licensed contractor and either disposed of or recycled at a licensed waste management facilities.

### **2.8.5 Mine water management, supply and storage**

The EIS addressed the mine water management system, including water usage, supply, storage, management and required approvals.

The water supply for the project would comprise pit water, void water and raw water.

The EIS stated that the site's water balance model had been updated to include the expansion project's inflows and outflows. Raw water and recycled water demand and mine water storage capacity were determined for the existing mine and the expansion project.

According to the EIS, approximately 945 Megalitres (ML) of raw and recycled water storage capacity would be required. This supply would equate to two years annual average water demand during the operational stages of the project. The EIS stated that the project's water supply would be sourced from the existing Naroo Dam catchment area and mine pit dewatering, to service the mine water distribution network. This water supply would be stored in two dedicated raw water dams:

- Naroo Dam is the primary source of raw water for the project site with a 745ML reservoir capacity primarily used to supply water to the accommodation village and workshop
- the proposed Water Storage Dam 2, the supplementary source of raw water for the project site, would be a 1.3 Gigalitre (GL) dam containing an internal wall which would separate raw water (200ML) and pit water (1.1GL).

According to the EIS, these raw water dams would have sufficient storage capacity to supply the project's future raw water demand to the end of mine life.

The EIS stated that meeting the potable water demands would require on-site treatment of the raw water to meet appropriate standards for human consumption. Potable water for the accommodation village is sourced from the Naroo Dam and treated using a water purification system prior to consumption. In emergency situations, potable water would need to be imported from external suppliers to meet demand, and this would be managed in accordance with the RCM's current trigger action response plans.

The water balance for the expansion project is an extension of the water balance operated currently on the RCM site. The water balance model was updated to include additional water management infrastructure, inflows and out flows for the expansion project. According to the EIS, the water balance was developed to:

- estimate runoff, mine water consumption and identify water deficits and surpluses
- inform the design of mine water management infrastructure
- quantify the performance of the mine water management
- assess the long-term performance of the residual voids.

The water balance model used GoldSim software to size all additional water storages required on the mine site to ensure that any water releases from the mine site would only occur in accordance with proposed EA release conditions.

The EIS water management strategy described management measures to minimise the potential impact on downstream watercourses, users and environmental values.

## 2.8.6 Sewage treatment

According to the EIS the existing RCM sewage treatment plant (STP) and associated infrastructure has sufficient capacity to manage and service the expansion project. The STP would be required to treat on-site sewage that would be generated from facilities within the MIA, including administration buildings and crib huts, CHF, security building and the RCM workers accommodation village. Remote or short term demand for facilities would be managed through portable units with the effluent to be transported and treated with in the STP.

## 2.9 Rehabilitation and decommissioning

Rehabilitation of disturbed areas would be carried out progressively throughout the life of the project. The stated objective of the rehabilitation strategy is to return areas affected by mining activities to a stable, non-eroding, and safe condition with biologically sustainable ecosystems, requiring minimum long-term management. The EIS proposed that post-mining land use should be reinstated to the previous pre-mining land use (i.e. low intensity grazing) except for residual voids where a lower land value is expected at the end of mine life. A mine closure plan was not developed as part of the EIS. However, a conceptual mine closure plan has been developed for the RCM. The EIS included a commitment to develop a detailed mine closure plan, including specifics of rehabilitation and decommissioning, five years prior to closure to ensure that the project site is safe, stable and in compliance with the EA conditions.

### 2.9.1 Final voids

The EIS identified that nine final voids, covering an area of approximately 538ha, would remain at the end of mine life. Five would remain on ML70307, three within MLA70415, and one on MLA70416. The EIS stated that a number of these residual voids would be connected, resulting in six major voids. Four of these are part of the project and considered in this assessment report. The EIS noted that the final number and size of the residual voids would be dependent on the volume of waste material placed in former pits. Final voids would only have direct rainfall inputs which would accumulate in the void with groundwater. Surface water would be prevented from entering the voids by installation of interceptor drainage channels and drains directing surface water flows away from the final voids and to the surrounding environment, when the rehabilitation and water quality is suitable for release to the external environment.

As part of the final landform, additional levees would be constructed along the realigned Paton's Spring Gully and Gibbs Gully on ML70415, and Meteor Creek on MLA70416 in order to protect final voids from surface flow inundation. The project's final voids were assessed and identified as:

- Gibbs Gully and West 1 on MLA70415 (16ha)
- West 2 and 3 on MLA70415 (136ha)
- West 4 on MLA70415 (110ha)
- Rolleston South on MLA70416 (39ha).

Meteor West (37ha), Bootes West (61ha) and Spring Creek A and B final voids (139ha) were not considered in this assessment as they were assessed as part of the previous RCM EIS.

The EIS stated that the levees would be built from competent material, including rock armouring, to provide hard erosion protection until vegetation could provide adequate stabilisation protection; this was stated as sufficient to prevent inundation of the void by flood water from up to a 1000 year Average Recurrence Interval (ARI) event. The EIS stated that the possibility and magnitude of overtopping of the levees should be further investigated and incorporated in the project's detailed residual void assessment.

The EIS estimated that water levels in the final voids would stabilise in about 100 to 150 years post mining. Furthermore, the EIS stated that as each void would reach a 'quasi equilibrium' storage level at that time. The EIS estimated the project's long term void water capacity as:

- Gibbs Gully and West 1 on MLA70415 (41%)
- West 2 and 3 on MLA70415 (83%)
- West 4 on MLA70415 (55%)
- Rolleston South on MLA70416 (75%).

The EIS modelled and discussed the expected long-term water quality of the final voids. The EIS provided an estimate of the predicted water level below the final formed landform ground level, the long term void storage volume capacity, the time period required for the water level in the voids to reach equilibrium and how this compares to the pre-mining groundwater level. The EM plan would be required to be updated to include further information on water quality characteristics (e.g. modelled end-of-mine TDS) for the residual voids.

The EIS stated that safety fences would be constructed around each final void to limit access by people, wildlife and livestock. The safety fences would be constructed in accordance with the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland, including with a minimum height of 2m and be located at least 10m beyond the area potentially affected by any instability of the pit edge. The residual final voids would have no positive land use value at the end of mine life.

## 2.10 Transport

The project is serviced by a network of state-controlled and local government roads. These roads connect the mine site to the local communities of Rolleston, Emerald and the wider localities of Mackay, Townsville, Gladstone and Rockhampton, Brisbane, Mt Isa and Longreach. Primary access to and from the mine site is on the 7km long private RCM access road from the state-controlled road (SCR) network via the Dawson Highway. The private access road features a secured entry and exit point that manages access to and from the project site. The existing State and local road network is used for a variety of purposes including general traffic for private and commercial purposes and movement of agricultural and farm equipment and stock.

During the construction and operations phases of the project, road transport would be required to move materials such as diesel fuel, oversized equipment, explosives, mine products and construction materials, supplies and the movement of mine workers to and from the site.

Transport infrastructure used during the operation stage of the project would include:

- the local road network managed by CHRC including Springwood Road
- the SCR network managed by the DTMR including the Dawson Highway
- the rail network including Aurizon's Blackwater System and Bauhinia branch line
- airports including the Emerald Airport and the Rolleston Aerodrome
- port facilities including coal facilities at the Port of Gladstone's RG Tanna Coal Export Terminal and the Wiggins Island Coal Export Terminal (WICET) when complete.

According to the EIS, the project requires the re-alignment of some public roads and road reserves within and adjacent to project site. The EIS stated that it is planned to maintain access along Springwood Road during its proposed re-alignment by constructing a new road whilst maintaining access for road users along the existing road. Options for re-alignment have been considered in the EIS and the preferred alignment considered in this assessment report. Further consultation with DNRM, DTMR and CHRC will be required to finalise approvals for the road corridor and re-alignment.

All final road upgrades would be designed in accordance with DTMR and CHRC guidelines and requirements. The EIS committed to providing the necessary information to DTMR and CHRC in the detailed design stage of the project on all proposed road upgrades.

The EIS stated that no upgrade to road-rail interfaces would be required.

According to the EIS, the project would generate two additional 8400t payload trains per day along the Blackwater Rail System which would equate to an increase of 10% of additional traffic along the Blackwater Rail System. The EIS committed to minimise coal dust emissions from coal rail wagons by profiling the surface and veneering of the coal in the wagons with a polymer coating treatment at the rail load-out facility.

## 2.11 Energy

The EIS stated that the existing RCM is supplied with power from an Ergon Energy substation located near the boundary of ML70307. The substation has a design capacity of 2 x 50 megavolt ampere (MVA) transformers configured for an N-1 arrangement.

At full production, and during the construction and operational phases, electrical power demand from the project includes:

- the RCM workers accommodation village
- MIA, MSA, CHF
- mine equipment including the additional third 8750 sized dragline and a P&H 4100 XPC AC sized shovel
- water management system, including pump equipment
- TLO facility.

The permanent power supply to the project is via a 66kV high voltage connection which is planned to be extended out to the MSA and operational areas during Stage 2 (Year 4 – 6) of the project.

The EIS stated that mobile diesel generator units would be available for use on-site as back-up for emergency use. This equipment enables site essential services to operate should a power outage occur at the substation. The RCM site currently includes:

- 3 x generators for emergencies to power the site village
- 1 x generator to power the site security hut
- 1 x generator to power the site MIA
- 2 x mobile generators that could be used around site.

## 2.12 Telecommunications

The EIS stated that the existing RCM currently uses the following data and communications technology management systems:

- Wide Area Network – Telstra’s IPAN managed data network using a 6MB ATM service
- Fibre-optic cable connections between:
  - Telstra tower
  - MIA
  - CHF
  - RCM accommodation village
  - Warehouse
  - Security gatehouse
  - Hasting Deering Office
- UHF radio system
- iVolve fleet management system, using Nexis wireless radios – 5.8GHz unlicensed band backhaul to the 2.4GHz Wireless Mesh covering the mining areas.

According to the EIS the following upgrades and additions to telecommunications equipment would be required:

- upgrade of the Telstra NextG service including a new tower and base station to the RCM workers accommodation village
- potential replacement of the UHF radio system with a digital trunk radio system
- potential replacement of the current fleet management system with an upgraded fleet management system
- additional communication and information management infrastructure for the MSA, including a microwave link from the satellite MSA to the MIA. This would provide wireless data communications and information management systems for all of the western operation in MLA70415.

## 2.13 Workforce and accommodation

According to the EIS, the current operational workforce is approximately 835, including 545 employees (65%) and 290 (35%) contractors. The majority of the operational workforce is employed in the open-cut operation (41%). The project would employ a peak expansion construction and operational workforce of approximately 1030 mine employees. An estimated 170 mine workers would be employed as direct result of the expansion. The construction and operational workforce includes full-time staff, operators, maintenance workers, contactors and apprentices who would be employed during the major construction, operations, decommissioning stages, maintenance, and special tasks of the project.

The EIS anticipated that the construction period shift rotation would be ten days on then four days off, and a 12-hour shift roster, with the bulk of work taking place during daylight hours. The operational workforce would continue to work a shift rotation of 12 hour shifts per day, rotating seven days on then seven days off all year round. Permanent non-operational staff would work a five days on then two days off roster, as per the normal working week.

The majority of RCM employees (approximately 80%) and contractors (approximately 90%) are non-resident workers who live in the RCM accommodation village when on shift. The balance of the workforce (approximately 110 employees) live locally in privately owned or rented accommodation or in XCQ owned and provided housing (22 houses).



According to the EIS, the majority of construction and operation workers are currently housed in two accommodation villages with a combined approved capacity of 852 rooms:

- Central accommodation village (on ML70307) – 152 contractor rooms
- Rolleston accommodation village (on MLA70415) – 700 operations rooms.

The project would add an extra 100 rooms to the accommodation village to meet the expanded project workforce requirements.

The EIS stated that the project's employment strategy was developed on a fly-in fly-out (FIFO) or drive-in drive-out basis and that 85% of the construction workforce would be sourced and transported on commercial flights to Emerald Airport. The EIS estimated that approximately 10% of the workforce would be sourced from within the local and wider CHRC region. These workers would travel daily in private vehicles and by bus from Springsure to the mine site, from local towns within an approximate 1 hour drive of the project area.

## 3 The EIS process

### 3.1 Timeline of the EIS process

The EIS process was initiated by an amendment application made by the proponent on 14 October 2009 for an EA (Mining Activities) for a Non-code Compliant Level 1 mining project. On 27 October 2009, the then DERM, now EHP, decided that the application would be assessed as a Non-code Compliant Level 1 mining project and that an EIS would be required. Consequently, this EIS assessment process is covered under the transitional arrangements under the *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Act 2012*. XCQ was advised on 10 November 2009 to submit a draft TOR which would commence the EIS process. On 11 August 2011, XCQ submitted draft TOR for the project which commenced the EIS process.

On 13 May 2011, the project was referred to the Australia Government to determine whether the proposed action would need assessment and approval under the EPBC Act. On 21 June 2011, the then Commonwealth SEWPAC, now DOE, decided (EPBC Referral Number 2011/5965) that the proposed action was a controlled action under the EPBC Act due to the potential impacts on MNES.

On 22 August 2011 and 2 September 2012, two variations to the approval were made to DOE. The first variation was made to include MLA70458. The second variation was made to align the expansions project's proposed footprint with that of the approved Rolleston Coal Mine (EPBC 2001/497 and EPBC 2009/5175) and to include an area of the proposed off-lease re-alignment option of Springwood Road. The variations were approved to be part of the controlled action on 4 November 2001 and 12 November 2013 respectively. Additionally, on 17 October 2013, the Commonwealth Minister for the Environment advised the proponent that he had determined a water resource, in relation to coal seam gas development and large coal mining development, was an additional controlling provision for the project. The controlling provisions are:

- world heritage properties (sections 12 and 15A)
- national heritage places (sections 15B and 15C)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (section 20 and 20A)
- Great Barrier Reef Marine Park (sections 24B and 24C)
- a water resource in relation to coal seam gas development and large coal mining development (sections 24D and 24E).

The State's EIS process is accredited to be the assessment process under Part 8 of the EPBC Act in accordance with the Assessment Bilateral Agreement between the Commonwealth of Australia and the State of Queensland (the bilateral agreement) relating to environmental impact assessment. These requirements are incorporated by the State in a project's EIS assessment process. The Commonwealth was included as an advisory body for the assessment of the project and provided its comments on the draft TOR and EIS documents. A copy of this assessment report will be given to the Commonwealth Minister for the Environment to assist him in making a decision on the project under the EPBC Act.

On 28 June 2011, EHP received a copy of the draft TOR an Initial Advice Statement (IAS) and list of interested and affected persons. On 11 August 2011, XCQ formally requested a withdrawal of the draft TOR, stating the withdrawal was to delay the scheduled draft TOR advertising date.

On 12 August 2011 EHP received a resubmitted revised draft TOR, IAS and list of interested and affected persons which recommenced the EIS process. On 12 August 2011 EHP notified XCQ of its decision to publish the draft TOR in: The Central Queensland News on 2 September 2011; The Brisbane Courier-Mail on 3 September 2011; and the Miners MidWeek on 7 September 2011. Copies of the draft TOR were circulated to all advisory bodies. The comment period for the draft TOR was from 7 September 2011 until close of business on 14 October 2011.

EHP received comments on the draft TOR from 21 advisory bodies and stakeholders during the comment period and three other comments after the comment period. All comments, including one from EHP, were forwarded to XCQ on 28 October 2011. On 25 November 2011, XCQ requested, and EHP agreed to, a longer period to respond to comments received on the draft TOR. XCQ responded to the comments on 30 November 2011 and EHP published the final TOR on 13 January 2012, taking into account all comments and XCQ's response to those comments.

On 17 December 2013, XCQ submitted an EIS for EHP's review and its decision on whether to allow the EIS to proceed to the notification stage under section 49(1) of the EP Act. EHP advised XCQ that important elements were missing from the EIS. During January 2014 EHP provided XCQ with its written review comments and subsequently discussed those comments with them. In a response dated 27 January 2014, XCQ formally requested that EHP extend its section 49(1) of the EP Act decision period and also sought a longer period for its submission of the EIS under section 47(1)(b) of the EP Act. On 30 January 2014, EHP decided to extend the period under section 49(1) of the EP Act until 14 March 2014, on the condition that XCQ made its amendments to the EIS by that date. EHP's reason for the extension was to allow time for:

- XCQ to amend the EIS to adequately address the final TOR in an acceptable form and by providing additional information about ecological values, air quality, nuisance dust fall results, probable maximum flood levels (PMF), TOR cross references, missing appendices and coordinates on maps and figures
- EHP to consider the amended EIS and to make a decision on whether the EIS may proceed under section 49(1) of the EP Act.

A revised EIS was resubmitted to EHP for review on 13 March 2014. On 14 March 2014, EHP decided that the submitted EIS could proceed to public notification and that the submission period would be from 7 April 2014 to 21 May 2014. XCQ published the EIS notice in The Central Queensland News and The Brisbane Courier-Mail on 4 April 2014, and the Weekend Australian on 5-6 April 2014. On 4 April 2014, the EHP website noted the start of the submission period for the EIS. On 17 April 2014, XCQ provided a statutory declaration of compliance in accordance with sections 51 and 52 of the EP Act.

A total of 611 submissions were received in response to the public notification of the EIS, including 585 submissions during the public notification period. Another 26 submissions were received outside the period and were accepted by EHP as being properly made. The submissions comprised:

- 16 submissions from State government agencies
- a submission from the Commonwealth DOE
- a submission from the Independent Expert Scientific Committee (IESC) appointed under the EPBC Act
- a submission from CHRC
- 18 submissions from non-government persons and organisations, including on behalf of Lock the Gate Alliance Inc. (LTGA), Fitzroy Basin Association, U&D Mining Industry (Australia) Pty Ltd and Friends of the Earth, Brisbane
- 574 submissions from persons based either fully or partly on a letter hosted via a LTGA website.

EHP provided those and its own submission to XCQ on 4 June 2014 and advised that a response to all submissions and the relevant amendments to the EIS would be due to EHP on or before 3 July 2014.

On 1 July 2014, XCQ sought a longer period of time within which to make the response to submissions. On 2 July 2014 under section 56(3)(b) of the EP Act XCQ was granted an extension until 31 December 2014 to submit the response to submissions and an amended or replaced EIS.

On 10 November 2014, XCQ submitted an amended EIS responding to submissions and an EIS amendment notice as required under section 66 of the EP Act.

On 8 December 2014, under section 56A of the EP Act, EHP decided that the submitted EIS could proceed to the assessment report phase. A notice of that decision was given to XCQ on 10 December 2014.

Unresolved concerns remained from reviewers relating to ecological impacts from modelled groundwater changes. Consequently, on 5 February 2015 XCQ requested further time to provide additional written information to resolve those matters. EHP considered XCQ's request and decided on 5 February 2015 under section 555 of the EP Act to extend the decision period to 23 February 2015 to give XCQ time to provide the additional written information.

On 13 February 2015, XCQ provided additional information in a letter to clarify ecological impacts from modelled groundwater changes.

The finalisation of this assessment report and its provision to XCQ would complete the EIS process.

A copy of this report will be given to the Commonwealth Minister for the Environment to assist in making a decision on the project under the EPBC Act.

## 3.2 Approvals

The EIS provided a satisfactory summary of the purpose of the legislation, regulatory approvals and policies required for the project.

**Table 1 Project approvals**

Approval	Legislation (administering authority)
<b>Commonwealth legislation</b>	
Approval to undertake action that may impact on a matter of national environmental significance (MNES). Refer to sections 3.4.5, 5 and Appendix B for details	<i>Environment Protection and Biodiversity Conservation Act 1999</i> (Department of the Environment)
<b>State legislation</b>	
Environmental Protection Regulation 2008, activities that would otherwise be an environmentally relevant activity (ERA): Schedule 2: Chemical storage (ERA 8(1)(c)), Sewage treatment (ERA 63(1)) Schedule 2A: Mining black coal (ERA13) Offset management plan Watercourse diversion	<i>Environmental Protection Act 1994</i> Queensland Biodiversity Offset Policy (existing RCM EA and application to amend the existing EA was in force prior to 1 July 2014) (Department of Environment and Heritage Protection)
Permits for the clearing of protected plants, to take wildlife and damage mitigation permit	<i>Nature Conservation Act 1992</i> (Department of Environment and Heritage)
Permit for clearing remnant vegetation (other than exempt development on the MLAs)	<i>Vegetation Management Act 1999</i> (in conjunction with the <i>Sustainable Planning Act 2009</i> (SP Act)) (Department of Natural Resources and Mines)
The project requires leases to be approved for mining lease application (MLA) 70415, 70416 and 70458	<i>Mineral Resources Act 1989</i> (Department of Natural Resource and Mines)
Regional Interest Development Approval – Priority Agricultural Area (PAA) and Strategic Cropping Area (SCA)	<i>Regional Planning Interests Act 2013</i> (RPI Act) (commenced on 13 June 2014) (Department of State Development, Infrastructure and Planning / Department of Agriculture, Fisheries and Forestry where DAFF is the assessing agency for PAA / Department of Natural Resource and Mines where DNRM is the assessing agency for SCA)

Approval	Legislation (administering authority)
	<p><i>Note: The Strategic Cropping Land Act 2011(SCL Act) has been repealed and replaced in part by RPI Act. There are transitional provisions in the RPI Act for the repealed SCL Act:</i></p> <ul style="list-style-type: none"> <li>• transitional provisions begin at section 97 (definitions)</li> <li>• section 98 - validation applications not yet decided will, at the commencement of the RPI Act, continue to be dealt with and decided on under the SCL Act.</li> </ul> <p>While the Project did fall under the transitional arrangements provided in Chapter 9 of the SCL Act, the SCL assessment requirements for the project were only partially fulfilled under the SCL Act before the Act was repealed.</p> <p>Under Chapter 9, Part 3, Division 3 of the SCL Act the 'exclusion' granted to the Project was from the 'permanent impact restriction'(section 94 SCL Act). This effectively exempted XCQ from requiring a successful exceptional circumstances application to be able to permanently impact SCL in the 'SCL protection area' and provided the opportunity for XCQ to make application for either a validation decision or a protection decision on the SCL.</p>
Water licences (taking or interfering with water, other than diversion of a defined watercourse)	<i>Water Act 2000</i> (Department of Natural Resources and Mines)
Interfere with forest products or quarry material	<i>Forestry Act 1959</i> (Department of Agriculture, Fisheries and Forestry)
Management of pests and stock route network	<i>Land Protection (Pest and Stock Route Management) Act 2002</i> (Department of Agriculture Fisheries and Forestry)
Regional Harbour Master approval for scheduling, safety and operational aspects of any specialised cargo or ship to the ports of Mackay and Gladstone	Regional Harbour Master's Direction under Sections 86 and 86A of the <i>Transport Operations (Marine Safety) Act 1994</i> , <i>Transport Operations (Marine Pollution) Act 1995</i> and <i>Maritime Safety Queensland Act 2002</i> (Maritime Safety Queensland, Department of Transport and Main Roads)
Road diversions and development / infrastructure approvals	<i>Transport Infrastructure Act 1994</i> (Department of Transport and Mains Roads) <i>Local Government Act 2013</i> (Central Highlands Regional Council)
Permit to transport oversize vehicles	<i>Transport Operations (Road Use Management) Act 1995</i> (Department of Transport and Main Roads)
Temporary or permanent closure of stock routes, and Springwood Road and Mt Kelman Access Road	<i>Land Act 1994</i> (Department of Natural Resources and Mines)
Cultural Heritage Management Plan (CHMP)	<i>Aboriginal Cultural Heritage Act 2003</i> (Department of Aboriginal and Torres Strait Islander and Multicultural Affairs)
A licence to use, possession, storage, transportation of explosives	<i>Explosives Act 1999</i> (Department of Natural Resources and Mines)

Approval	Legislation (administering authority)
<p>Operational works approval for the construction or raising of a waterway barrier works outside the MLA areas.</p> <p>Other assessable development for which a development application is required for the road</p>	<p><i>Sustainable Planning Act 2009</i> (Department of State Development, Infrastructure and Planning)</p> <p><i>Fisheries Act 1994</i> (Department of Agriculture Fisheries and Forestry)</p>

**Note:** Table 1 does not necessarily list all legislative approvals that may be required.

### 3.2.1 Mineral Resources Act 1989

An exploration permit issued under chapter 4 of the *Mineral Resources Act 1989*, allows the holder to undertake exploration activities on the permit land. Exploration permits act also as a prerequisite for acquiring higher forms of tenure. XCQ holds MLAs over the proposed mine area, namely for MLA 70415, 70416 and 70458. To implement the project these applications would require approval.

### 3.2.2 Environmental Protection Act 1994

The conduct of proposed project activities within the MLA would require an EA under chapter 5 of the EP Act. This approval would cover mining and the activities listed as environmentally relevant activities (ERAs) under schedules 2 and 2A of the Environmental Protection Regulation 2008 (EP Reg) that are directly associated with, or facilitate or support, the mining activities. Relevant activities that would otherwise be ERAs for the project include: Mining black coal (ERA13); Chemical storage (ERA8(1)(c)); Sewage treatment (ERA 63(1)).

According to the EIS nine lots were identified and listed on the Environmental Management Register (EMR) for land uses including cattle dips, waste, explosives and fuel storage and mineral processing.

The following notifiable activity under Schedule 3 of the EP Act would also apply to the project:

- Notifiable Activity 24, Mine wastes
  - (a) storing hazardous mine or exploration wastes, including, for example, tailings dams, overburden or waste rock dumps containing hazardous contaminants; or
  - (b) exploring for, or mining or processing, minerals in a way that exposes faces, or releases groundwater, containing hazardous contaminants.

A Preliminary Site Investigation in accordance with the National Environmental Protection (Assessment of site contamination) Measure 1999 (NEPM) and Guideline for Contaminated Land Professionals (EHP, 2012) is required to be undertaken to further investigate areas of potential contamination. Should a preliminary site investigation indicate the presence of contaminants at levels that are a substantial risk to the public or environment, a detailed site investigation must be undertaken by a suitably qualified person (SQP) under the EP Act. The extent of any identified contamination must be adequately delineated and contamination remediated and or management strategies developed to ensure risks to human health and the environment with regard to contaminated land matters are adequately managed during construction and operational phases.

Furthermore, any site investigations or site management plan developed in relation to contaminated land must be undertaken by a suitably qualified person as required by the EP Act.

Prior to construction, certification of the functional design (and specifically a Design Plan) for the diversion of Sandy Creek would be required to be undertaken by a SQEP to ensure that the watercourse diversion would achieve the outcomes stated in the DNRM Guideline – Works that interfere with water in a watercourse: watercourse diversions (2014). This would occur in accordance with section 20(4) of the Water Act and the DNRM guideline. The certified design plan must be submitted to the administering authority prior to the commencement of construction. The assessment of the diversion in this assessment report has been undertaken on the basis that this would be in place by the time the draft EA is notified.

### 3.2.3 Water Act 2000

The Water Act provides for the sustainable management of water and other resources and the establishment and operation of water authorities. The act enables the advancement of sustainable management and efficient use of water and other resources by establishing a system for the planning, allocation and use of water, which includes responsible granting of various water licences and permits. The Water Act enables the granting of various water licences and permits.

The EIS indicates that where there was a deficit of raw water available to meet mining and raw water supply demands, an additional volume would be required. XCQ propose to seek this additional supply through an agreement with external supplier. Alternatively, they may apply for unallocated water indicated within the Water Resource (Fitzroy Basin) Plan 2011.

Under current legislative provisions, a water licence under the Water Act would be required to take or interfere with groundwater for pit dewatering purposes for the project.

### **3.2.4 Aboriginal Cultural Heritage Act 2003**

An approved cultural heritage management plan (CHMP) is a requirement under section 87 of the *Aboriginal Cultural Heritage Act 2003* (ACH Act). A CHMP is required under the ACH Act prior to approvals being issued for the project. The EIS stated that the potential impacts of the project on Indigenous cultural heritage would be managed in accordance with two, approved CHMPs. They are:

1. Cultural Heritage Management Plan – Rolleston Mine 2003 (as amended in 2012)
2. Rolleston Coal Expansion Project – Cultural Heritage Management Plan 2013

The Cultural Heritage Management Plan – Rolleston Mine 2003 (as amended in 2012) was for that part of the project within ML70307. The EIS stated that the Rolleston Coal Expansion Project – Cultural Heritage Management Plan 2013 was finalised between XCQ and the Traditional Owners, the Bidjara People (QC08/5 – QUD216/08). This plan was approved by Department of Aboriginal and Torres Strait Islander and Multicultural Affairs (DATSIMA) on 3 April 2013. Details of the plans are included on the Cultural Heritage Register maintained by DATSIMA. The second plan provides for cultural heritage surveys to be conducted over MLA70415, MLA70416, ML70418 and MLA70458 where mining activities would take place and would provide suitable measures to protect identified Indigenous cultural heritage values ahead of any disturbance. XCQ committed to manage any potential impact to Indigenous cultural heritage values in accordance with the CHMPs.

Section 4.19 of this EIS assessment report provides further information on Indigenous cultural heritage related matters.

### **3.2.5 Nature Conservation Act 1992**

XCQ would need to comply with the *Nature Conservation Act 1992* (NC Act), particularly in regard to obtaining the following approvals for the project:

- where there is a requirement for the clearing of plants protected under the NC Act, clearing of protected plants must only occur in accordance with an exemption under the NC Act
- where activities may cause disturbance to animal breeding places, XCQ must prepare a species management program and obtain approval from EHP
- a spotter catcher employed by the project must be in possession of a rehabilitation permit (spotter catcher endorsement) for managing fauna during clearing activities
- if it is necessary to remove animals posing a threat to human health or property, a damage mitigation permit would be required.

### **3.2.6 Queensland Heritage Act 1992**

The EIS stated that a non-Indigenous cultural heritage assessment was undertaken to identify and assess the nature and significance of cultural heritage within the project area. From a non-Indigenous cultural heritage perspective surveys of the project site found relatively low levels of local European cultural heritage significance, represented primarily by historical European settlement (working and living areas, e.g. yards, sheds) associated initially with sheep grazing from the mid-1880's until the late 1930s and then later cattle grazing and bull breeding. A search of the Queensland Heritage Register revealed no registered heritage place on the project site. The EIS identified a potential archaeological historical yard and hut complex in the north of the project area (MLA70458) but outside the project disturbance footprint. Site investigations did not identify any structures above ground, however records of their existence or use may be present below ground. In accordance with section 88–90 of the *Queensland Heritage Act 1992* (QH Act), XCO would need to notify EHP if an archaeological artefact is discovered and provide information on the location and description of the discovery. A Historical Heritage Management Plan (HHMP) was not provided in the EIS. Should archaeological deposits be uncovered during construction, a 'Stop Works' process outlined in the EIS would be undertaken. The EIS outlined the 'Stop Works' process procedures for reporting discoveries of artefacts and burials and recommendations for handling impacted heritage values potentially impacted by the project.

Section 4.19 of this EIS assessment report provides further information on non-Indigenous cultural heritage related approvals.

### **3.2.7 Transport Infrastructure Act 1994**

To ensure compliance with the *Transport Infrastructure Act 1994*, *Transport Operations (Road Use Management) Act 1995*, *Transport Operations (Maritime Safety) Act 1994* and *Maritime Safety Queensland Act 2002* XCQ would need to consult with the DTMR on all matters concerning:

- road impacts assessments, including the level of project traffic on Blackwater–Rolleston Road and the identification of any mitigation measures required to manage project traffic impacts
- turn warrants for key intersections affected by project generated traffic in particular the Carnarvon Highway–Dawson Highway intersection
- the increased impacts on maritime safety and marine pollution related to increased transport of product coal via Queensland waters
- maritime safety and pollution, including shipping plans and schedules.

XCQ would need to apply for permits for over-dimension loads and road corridor permits. Section 4.15 of this EIS assessment report provides further information on transport related approvals.

## **3.3 Consultation program**

### **3.3.1 Public consultation**

XCQ undertook the statutory requirements for advertising the TOR, EIS and notices to interested and affected parties. The EIS carried out a social impact assessment (SIA) to collect and analyse information about key social and cultural issues, population change and communities and social relationships that are likely to occur as a direct or indirect result of the project. The EIS's social baseline study aimed to capture the most important community values. Outcomes of the assessment were used to develop a project specific draft Social Impact Management Plan (SIMP). Information collected for the SIA was through a desktop review and direct consultation and engagement with individuals, affected and interested persons, key community leaders, organisations, stakeholders and local and State government representatives by:

- organising and conducting community and near neighbour face-to-face meetings, telephone interviews and information sessions
- presenting information to gatherings of stakeholders and other interested groups
- developing contact points such as a project email address, free call 1800 information hotline and dedicated website
- liaising with identified interested and affected parties by establishing the Rolleston Coal Community Reference Group (CRG)
- conducting community information workshops and youth focus groups to identify priority community issues that may affect the project
- preparing and distributing project information fact sheets and newsletters to affected and interested community members
- advertising community information workshops through the local print media
- facilitating landholder agreements.

XCQ organised face-to-face meetings with elected representatives and affected landholders on 2 and 5 September 2011 respectively; and CRG members meetings on 15 September 2011 and 14 February 2012 to coincide with community consultation events in Rolleston and Springsure. CRG meetings were scheduled three times a year and were designed to update members on both the current RCM operations and status of the expansion project.

A site visit was held on 4 and 5 March 2013. During the public submission period of the EIS, XCQ conducted briefings on the project for Commonwealth and State government advisory agencies and directly affected landholders in Brisbane, Rolleston, Emerald and Mackay and Rockhampton in late April and early May 2014.

The EIS listed the stakeholders, the engagements completed and the resources applied. The EIS stated that the issues raised were responded to in follow up sessions and a regular newsletter circulated locally and to interested persons. A summary of the key themes raised by stakeholders during the pre-EIS community consultation program was provided in the EIS. The key issues were recorded and grouped to show the themes raised, the relative proportion of each theme that was associated with each issue and concern, and any benefits and opportunities.

The issues raised were grouped into the following themes:

- directly affected landholders
- economy
- education
- environment
- health
- housing
- infrastructure and services
- social cohesion and lifestyle
- water
- community engagement.

Key community concerns raised included:

- further increases in housing rental and purchase costs and loss of affordability for essential workers
- expansion of existing perceived social divide
- increases in road accidents, injuries and fatalities due to driver fatigue at shift changeover
- increased demand on social infrastructure, particularly health and emergency services
- further deterioration of the road network
- attraction and retention of skilled labour.

At the same time, the community raised the prospect of a number of opportunities including:

- increased local employment
- incentives for mine families to live in the towns
- affordable housing initiatives, education and training initiatives
- local procurement opportunities for small businesses and improved engagement between the mine and local communities.

These issues were subsequently discussed in the relevant sections of the EIS.

### **3.3.2 Advisory bodies**

EHP invited a range of organisations to assist in its assessment of the TOR and EIS by participating as members of the EIS advisory body including (original names as per 2009):

- Commonwealth Department of Sustainability, Environment, Water, Population and Communities
- Department of Communities
- Department of Community Safety
- Department of Education and Training
- Department of Employment, Economic Development and Innovation
- Department of Transport and Main Roads
- Queensland Health
- Queensland Police Service
- Queensland Treasury
- QR National
- SunWater Limited
- Capricorn Conservation Council
- Central Highlands Regional Council
- Ergon Energy
- Powerlink Queensland
- Fitzroy Basin Association Inc.
- Construction, Forestry, Mining & Energy Union.

#### **Australian government changes**

During the EIS process, the Department of Sustainability, Environment, Water Population and Communities, was restructured and changed names to the Department of the Environment in accordance with the Administrative Arrangements Order (CA 9334). The changes became effective on 18 September 2013.



### State government changes

During the EIS process, a significant number of those parties were restructured and or changed names and in accordance with the Public Service Departmental Arrangements Notice (No.1) 2012, the changes noted in Table 2 became effective on 3 April 2012 to the Queensland Government departments referred to in this report.

**Table 2 Changes to Queensland Government departments**

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

### 3.3.3 Public notification

In accordance with the statutory requirements, public notices of the draft TOR and EIS and public comment periods were published in the Weekend Australian, the Brisbane Courier-Mail, the Central Queensland News, Miners MidWeek and on EHP's 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, Customer Service Centre, 400 George Street, Brisbane
- EHP, 99 Hospital Road, Emerald
- Emerald Library, 44 Borilla Street, Emerald
- Springsure Library, 27 Eclipse Street, Springsure
- Rolleston Library, Planet Street, Rolleston
- Glencore office, 340 Adelaide Street, Brisbane
- Rolleston Coal Mine Administration Office, Dawson Highway, Rolleston.

## **3.4 Matters considered in the EIS assessment report**

Section 58 of the EP Act requires that an EIS assessment report consider the following matters:

- the final TOR for the EIS
- the submitted EIS (including XCCQ's response to submissions and replacement of the original EIS and EM plan dated October 2014)
- 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 published on 13 January 2012 were considered when preparing this EIS assessment report. Although compiled to include all the likely significant issues the TOR stated that if other significant matters arose during the preparation of the EIS then such issues should be fully included in the EIS. All such matters have been considered in the EIS assessment report.

In deciding to allow the EIS to proceed to the preparation of an assessment report, EHP was required to consider the submitted EIS documents and determine if the information provided in this documentation adequately met the requirements of the TOR.

### **3.4.2 The submitted EIS**

The submitted EIS was considered when preparing this report, it comprised:

- the EIS dated December 2013 (including amended Air Quality section dated April 2014) that was made available for public submissions on 7 April 2014 to 21 May 2014
- properly made submissions
- the response to submissions and the amended EIS dated October 2014, including a draft EM plan that were received by EHP on 10 November 2014.

### **3.4.3 Properly made submissions**

EHP accepted 23 submissions on the EIS from the following organisations:

- Central Highlands Regional Council
- Commonwealth Department of the Environment
- Commonwealth Independent Expert Scientific Committee
- Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
- Department of Agriculture, Fisheries and Forestry
- Department of Energy and Water Supply
- Department of Education, Training and Employment
- Department of Housing and Public Works
- Department of Justice and Attorney-General
- Department of National Parks, Recreation, Sport and Racing
- Department of Natural Resources and Mines
- Department of State Development, Infrastructure and Planning
- Department of Tourism, Major Events, Small Business and the Commonwealth Games
- Department of Transport and Main Roads
- Department of Energy and Water Supply
- Ergon Energy
- Fitzroy Basin Association Inc
- Friends of the Earth Brisbane
- Lock the Gate Alliance Inc
- Queensland Ambulance Service
- Queensland Fire and Emergency Services
- Queensland Police Service
- U&D Mining Industry (Australia) Pty Ltd.

EHP received 589 individual submissions from the public and EHP made its own submission on the EIS. Of the 589 individual submissions received, 574 submissions were received that were fully or partially based on a letter hosted via the Lock the Gate Alliance Inc. website. On 4 June 2014, EHP provided XCO with all 612 submissions received on the submitted EIS.

All submitters were also given the opportunity to provide a follow-up response to EHP on the suitability of XCO's response to their submissions. All submissions and other comments made by submitters 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 4 of the EP Act must be considered when preparing the EIS assessment report. The standard criteria are:

- a. the following principles of environmental policy as set out in the Intergovernmental Agreement on the Environment:
  - (i) the precautionary principle
  - (ii) intergenerational equity
  - (iii) conservation of biological diversity and ecological integrity
- b. any Commonwealth or State government plans, standards, agreements or requirements about environmental protection or ecologically sustainable development
- d. any relevant environmental impact study, assessment or report
- e. the character, resilience and values of the receiving environment
- f. all submissions made by the applicant and submitters
- g. the best practice environmental management for activities under any relevant instrument, or proposed instrument, as follows:
  - (i) an environmental authority
  - (ii) a transitional environmental program
  - (iii) an environmental protection order
  - (iv) a disposal permit
  - (v) a development approval
- h. 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
- i. the public interest
- j. any relevant site management plan
- k. any relevant integrated environmental management system or proposed integrated environmental management system
- l. any other matter prescribed under a regulation.

EHP considered the standard criteria when assessing the project.

### **3.4.5 Environment Protection and Biodiversity Conservation Act 1999**

On 13 May 2011, the project was referred to the Australia Government to determine whether the proposed action would need assessment and approval under the Commonwealth EPBC Act. On 21 June 2011, DOE decided (EPBC Referral Number 2011/5965) that the proposed action was a controlled action under the EPBC Act due to the proposed action being likely to have significant impact on the following Matters of National Environmental Significance (MNES) for the following matters:

- World Heritage properties (sections 12 and 15A)
- National Heritage places (sections 15B and 15C)
- Listed threatened species and communities (sections 18 and 18A)
- Listed migratory species (section 20 and 20A)
- Great Barrier Reef Marine Park (sections 24B and 24C).

On 22 August 2011 and 2 September 2012, XCQ made application to vary the project under consideration by DOE. The first variation was made to include MLA70458 and the second variation was made to align the project's proposed footprint with that of the approved Rolleston Coal Mine (EPBC 2001/497 and EPBC 2009/5175) and to include an area of the proposed off-lease re-alignment option of Springwood Road. The variations were on 4 November 2011 and 12 November 2013 respectively. Additionally, a water resource was introduced as a new MNES in 2013, that amendment applies to actions that the Minister has already determined to be a controlled action. Consequently, on 17 October 2013 the Commonwealth Minister for the Environment advised XCQ that he had determined that the new water resources controlling provision in relation to coal seam gas development and

large coal mining development (sections 24 D and 24E) was an additional controlling provision for the project.

This EIS process is accredited for the assessment under Part 8 of the EPBC Act in accordance with the Assessment Bilateral Agreement between the Commonwealth of Australia and the State of Queensland (the bilateral agreement) relating to environmental impact assessment. The Commonwealth was included as an advisory body for the assessment of the project and provided its comments on the draft TOR and EIS documents. A copy of this report will be given to the Commonwealth Minister for the Environment to assist in making a decision on the project under the EPBC Act.

As a controlled project, the project requires approval by the Commonwealth Minister for the Environment under the Commonwealth EPBC Act. The assessment provided in section 5 and Appendix B of this EIS assessment report would inform the Minister in making this decision.

## 4 Adequacy of the EIS

This section of the assessment report discusses in more detail the adequacy of the EIS, taking into account key matters of concern identified in the EIS and particularly those raised in submissions. The level of detail contained within the assessment reflects the significance of the potential impacts of the project, in proportion to the affected environmental values. Matters that need further assessment to address State policy and legislative requirements prior to statutory decisions being considered have been identified for action.

The following aspects are addressed for each topic:

- a brief outline of the assessment methodology
- a brief outline of the environmental values identified
- an overview of impacts identified in the EIS documents, as well as the adequacy of the assessment
- an overview of the avoidance, minimisation and management measures proposed, as well as their adequacy
- an evaluation of how adequately XCC has responded to significant issues raised in public and agency submissions on the EIS
- summary of the overall adequacy of the EIS, including any outstanding issues identified and any recommendations to address these issues. Recommendations are listed as either EM plan requirements or as general recommendations that XCC should address, including where required the timing of action in relation to subsequent approvals being considered.

### 4.1 Introduction

The EIS provided an adequate introduction to the project, its objectives and scope. The various sections are adequately set out and guidance about the structure of the EIS was provided.

### 4.2 Project need and alternatives

This section of the EIS adequately described the project need and alternatives in the context of the TOR. It briefly outlined the project's related social, community, economic and environmental benefits and costs, which were addressed in more detail in later sections of the EIS.

The positive and negative impacts, appropriate mitigation and management measures and environmental protection commitments proposed by XCC were addressed in later sections of the EIS.

Alternatives were considered and discussed in the planning and pre-feasibility stages of the project's development and included consideration of:

- conceptual alternatives
- technological alternatives
- locality alternatives
- not proceeding with the project.

The advantages of the preferred open-cut mining method were highlighted in the EIS. According to the EIS, approximately 90% of the identified coal resource within the project area occurs above a depth of 100m. The EIS also discussed the advantages and construction of associated mining infrastructure activities in comparison to a greenfield development and detailed the comparative potential environmental, social and economic impacts. The EIS stated that concept and feasibility studies considered options for mining infrastructure, including:

- mine pits and spoil areas
- haul roads and pit ramps
- power lines to service mine operations
- water infrastructure management and supply, including levees, diversions and dams
- MSA, including vehicle maintenance, crib and offices area
- local road re-alignment, in particular Springwood Road and Mt Kelman Access Road
- additional accommodation in the current village and wider community.

### **4.3 Impact assessment approach**

The impact assessment approach in the EIS was typically presented for each key matter of the TOR as follows:

- legislative and policy context
- assessment method
- environmental protection objectives
- existing environment and environmental values
- issues and potential impacts
- avoidance, mitigation and management measures
- residual impacts
- inspection and monitoring requirements.

### **4.4 Regulatory approvals**

The methodology and objectives of the EIS process, key approvals required for the project and relevant policies, guidelines, planning policies and planning schemes to be considered in assessing and regulating the project were adequately described in the EIS. These are summarised in section 3.2 of this EIS assessment report.

### **4.5 Consultation**

The consultation carried out by XCQ as part of the EIS preparation, including its objectives, activities undertaken, stakeholders consulted, stakeholder issues and the way in which these issues were addressed was adequately described in the EIS. A summary of the key issues raised during the consultation program and specific responses to the 612 public and agency submissions, including EIS updates where XCQ considered it necessary, were provided in the EIS. A summary of the consultation process undertaken by XCQ as part of the EIS process is summarised in section 3.3 of this report. Matters raised in submissions that have not been adequately resolved have been identified in the relevant sections of this report and collated at section 7 of this EIS assessment report.

### **4.6 Description of the project**

The EIS adequately described the location, scope, scale and schedule for the project works. A suitable description on aspects of the project was provided, including: the resource base, construction, proposed mining activities and handling, processing, operations, waste management, workforce accommodation and rehabilitation and decommissioning. However, aspects of the project that were not suitably addressed in the EIS included water supply, in particular the potential impacts and risks associated with supply of raw water to Naroo Dam by U&D Mining Industry (Australia) Pty Ltd's proposed Meteor South Coal Mine Project's operations on the adjacent MLA70452, which is anticipated to commence construction in 2015. The EIS stated that Naroo Dam is the only current source of water used for supply of raw water to the water treatment facility that provides a potable water supply to current RCM operations. A summary of the project is provided in section 2 of this EIS assessment report.

### **4.7 Climate**

The EIS adequately described the regional climatic patterns and climate change adaptation issues relevant to the project. Information was gathered from a desktop study of the Bureau of Meteorology's (BoM) online data and compared with data collected from the existing RCM. The BoM's online data was collected from a number of weather stations in the general area of the project, including in the township of Rolleston. The EIS included a suitable climate change adaptation risk assessment to assess potential impacts of alterations to weather patterns on the project.

### 4.7.1 Existing values

The EIS described the project site as located in the Central Queensland region which has a sub-tropical climate with hot, moist summers and warm, dry winters, with occasional frost in the south. Rainfall in the Central Queensland region is highly seasonal, with most rain occurring during October to March. The annual mean rainfall recorded for the period 1865 – 2012 at Rolleston was 639mm, with the wet season accounting for approximately 69% of the mean annual rainfall. The wettest month on average was February with a mean of 94mm whilst the driest month was August at 23mm. Rolleston's average minimum and maximum daily temperatures were typical of sub-tropical Queensland, showing the seasonal variation and the expected temperature range with the warmer summer months of December, January and February and cooler winter months in June, July and August. Mean minimum temperatures ranged from 5.6°C in July to 21°C in January while the mean maximum temperatures ranged from 22.9°C in July to 34.8°C in January. The average relative humidity recorded at 9am ranged from 55 – 74% while the average relative humidity recorded at 3pm ranged from 31 – 49%. Winds at Rolleston were predominantly light to moderate from the south, east, and north, with a relatively high frequency of calms. Overall wind patterns were similar at 9am and 3pm. However, more calm conditions occurred at 9am than 3pm. Average wind speeds varied from 8.1 – 12.8km/h.

Temperature inversion data was not available from the BoM. The existing RCM has recently established a weather station with sensors at differing heights that would assist with the interpretation of temperature inversions throughout the life of the mine.

### 4.7.2 Impacts

The EIS discussed vulnerability, risk and likelihood of hazards occurring in the project area due to natural or induced climatic based events. However, as outlined in the TOR, the following environmental impacts were assessed in separate assessments, such as:

- floods and wet weather events: Surface Water Chapter
- rainfall on soil erosion: Land Chapter
- storm events on the capacity of waste containment systems, such as site bunding and stormwater management with regard to the design of the waste containment systems: Waste Chapter
- storm events on the capacity of waste containment systems, such as site bunding, stormwater management and sediment dams with regard to contaminated waterways: Surface Water Chapter
- wind, rain, humidity and temperature inversions on air quality: Air Quality Chapter.

The following climatic events were identified and discussed in the EIS Climate Chapter, including:

#### Droughts

The EIS identified that in Queensland, droughts typically occurred over the following periods: 1900 – 1903, 1914 – 1916, 1929 – 1932, 1937 – 1939, 1960 – 1969, 1985 – 1987, 1991 – 1996 and 2000 – 2006. The drought in the early part of the 2000s was particularly prolonged and severe. Water management measures during potential drought conditions were discussed in the EIS Surface Water Chapter.

#### Floods

The potential impacts on the project and wider community arising from flood risks were considered in the EIS. The Comet River at Rolleston, of which Sandy, Meteor and Bootes creeks are tributaries, has been monitored for significant hydrological events since 1958. BoM records show that there were 25 major flood peaks (above 3.5m) since the monitoring of the river commenced. The most significant flood events occurred in 2010 with a flood peak of 5.87m on 19 February 2010 and later on in the year on 27 December 2010 with a flood peak of 8.54m.

Detail on baseline hydrological conditions, flood risks, the proposed mitigation measures and the resultant risk to the community were discussed further in the Surface Water and Hazard and Risk chapters of the EIS.

#### Bushfires

The Central Highlands Regional Council's Bushfire Risk Overlay Map, as part of its planning scheme, showed that the project area lies within the low bushfire severity zone with some smaller, dispersed areas of medium bushfire severity zones spread throughout. Proposed mitigation and management measures are discussed further below.

## Landslides and earthquakes

Landslide risk in the project area was considered low in the EIS, as the Central Highlands region is regarded as generally geologically stable and where morphological or physical conditions are not conducive to causing natural landslides. However, the EIS also stated that landslide risk due to human interaction, particularly excavating and mining activities, would need to be assessed progressively by XCC throughout the life of the mine. A technical assessment of the geotechnical stability of mining areas was assessed in the Land Chapter of the EIS.

The 2012 Australian Earthquake Hazard Map indicated that the project is located within a low hazard earthquake area with peak ground acceleration <0.02g in a 500 year return period. This hazard rating is based on historical records and modelling and the EIS concluded that an earthquake would be most likely of an intensity that would not cause damage to mine infrastructure. No landslide or earthquake mitigation and management measures were discussed in the EIS.

## Tropical cyclones

The EIS reported that the tropical cyclone season in Queensland typically lasts from November to April. BoM online data showed an average of 4.7 tropical cyclones per year. BoM's online maps were used to compare the trajectory of cyclones relative to the proposed mine site's location. For the period between 1906 and 2007, six cyclones occurred within 100km of the project site. As cyclone wind speeds and storm systems usually reduce as they travel inland, the EIS concluded that tropical cyclones would pose a low impact on the project and hence no further mitigation and management measures were discussed in the EIS.

## Climate change risk

The EIS analysed the climate projections based on climate models and the Intergovernmental Panel on Climate Change's (IPCC's) range of future greenhouse gas emissions scenarios. Climate change projections for 2030 showed little variation between different scenarios because near-term changes in climate were strongly affected by greenhouse gases that have already been emitted. For this reason, the projections for 2030 were based in the EIS on a mid-range emissions scenario. For 2070, low and high emissions scenarios are often presented. The EIS concluded however that the most recent scientific reports were showing that observed emissions of carbon dioxide (the most important greenhouse gas) were exceeding the IPCC's highest emissions scenario. The EIS presented climate change projections specific to the Central Queensland region based on the most detailed climate change projection currently available for the project site. While the proposed project is forecast to close and decommission from 2037, projections for 2050 and 2070 have been included for completeness to show the Queensland Government's long-term climate change scenarios (Table 3).

**Table 3 Climate change projections for the Central Queensland region \***

Climate change issue	Specific climatic variable	Current conditions	Projections for 2030	Projections for 2050	Projections for 2070
Increased temperatures	Average temperature	21.6°C	+1°C (22.6°C)	+2°C (23.6°C)	+3.2°C (24.8°C)
	Days over 35°C per year	16	+10 days (26)	+24 days (40)	+48 days (64)
	Average potential evaporation	1997mm	+3% (2057mm)	+7% (2137mm)	+10% (2197mm)
Reduced rainfall	Average rainfall	692mm	-3% (671mm)	+7% (740mm)	-10% (622mm)

\* (Source: EIS, Chapter 5, Climate, Tables 5-6)

The potential climate change risks were assessed the EIS in terms of potential changes to the following climatic variables:

- increase in frequency and intensity of extreme events e.g. cyclones, fire and floods
- decreasing average annual rainfall
- increase in days over 35°C and increasing average temperatures.

Sea level rise was not considered to be a risk to the project due to the inland location of the site.

Table 5–7 of the EIS reports on the outcomes of the climate change risk assessment without consideration of mitigation measures that might be implemented. In summary, the EIS analysis found that, the risks to the project from potential climate change with a high risk priority level included:

- delays in shipping of coal product due to severe storms, cyclones and other extreme events causing bottlenecks at ports
- damage to rail lines due to washouts
- the threat to mine water supply security
- the requirement to introduce low water use practices
- increased costs of water capture and storage
- the reduction in water supplies due to reduced water availability from on-site mine water storages.

The EIS identified the risks to the project with a medium risk priority, and a possible or likely chance of occurring as:

- damage to mine infrastructure from flooding and extreme storm events leading to delays in production
- increased impacts from flood events that result in overtopping of sediment dams
- delays in construction and operation of mine infrastructure
- inadequate water management infrastructure requiring costly upgrades or leading to flooding and inundation related costs
- damage to rehabilitation areas, resulting in increased remediation/maintenance costs
- increased difficulty in achieving rehabilitation success
- changes in surface water and groundwater interactions and movement of contaminants
- increased water demand for dust suppression due to drier surface conditions
- increased staff downtime due to hotter conditions resulting in reduced productivity
- increased vehicle and communication equipment maintenance and replacement costs due to heat related breakdowns
- faster deterioration of roads due to increased temperatures resulting in higher maintenance costs.
- increased cooling demand resulting in higher electricity costs.

### **4.7.3 Avoidance, mitigation and management measures**

#### **Fire management**

According to the EIS, given that climate change may increase the possibility of extreme events, the existing RCM Biodiversity and Land Management Plan would be required to be updated, taking into account the new single State Planning Policy (SPP), July 2014 and other relevant legislation or policies, and reflecting the change in operations and scope of the RCM. In terms of fire management, the Biodiversity and Land Management Plan would include:

- controlled burning of vegetation in the mine path to assist in operations
- measures to ensure the health and safety of all mine personnel
- protection measures for native vegetation from uncontrolled fires, including the Queensland blue-grass, *Dichanthium spp*
- measures to protect regeneration areas from uncontrolled fires
- measures to protect neighbouring properties (e.g. Albinia National Park) and mining infrastructure.

#### **Climate change risk**

The EIS summarised a full set of adaptation strategies to manage the potential high and medium risks to the project according to the risk priority level determined in the climate change risk assessment. The EIS outlined that the proposed adaptation strategies would be part of the Australian Government's National Greenhouse and Energy Reporting System and the Australian Government Energy Efficiency Opportunities Scheme. The EIS committed to implementing strategies to:

- identify, assess and monitor environmental impacts
- comply with applicable regulatory requirements and monitor relevant regulations for changes
- implement appropriate environmental management programmes and controls, including appropriate measures for emergency preparedness
- ensure competent staff and sufficient resources for environmental management



- involve contractors and service providers where appropriate
- implement programmes and targets for continuous improvement of XCQ's efficient use of resources (e.g. energy, water and land), the protection of biodiversity and climate change impact
- prevent pollution by addressing management of fresh water and effluent, waste, air emissions, hazardous materials and rehabilitation of land
- track actual environmental performance.

#### **4.7.4 Outstanding issues**

Several submitter comments were received on the Climate chapter. Key comments included the need to consider climate change impacts such as cyclones on the port region from where coal product would be exported; as well as impacts of coal combustion contribution to climate change. XCQ responded to each of the comments made and made amendments to the Climate and Air Quality chapters of the EIS. No outstanding issues were identified following XCQ's response to EIS submissions.

Comments made on climate issues related to surface water and groundwater management are discussed separately in sections 4.12 and 4.13 of this EIS assessment report.

#### **4.7.5 Conclusions and recommendations**

The EIS has adequately addressed the TOR for existing climate, the extremes of climate events and the vulnerability of the area to natural or induced hazards, such as cyclones, floods and bushfires.

### **4.8 Air**

The air shed and management of likely air impacts were described in EIS Chapter 11, Air Quality. Detailed air quality studies were undertaken and reported in EIS Appendix I1, Air Quality Impact Assessment. These documents were also updated and resubmitted by XCQ as a response to EIS submissions.

#### **4.8.1 Existing values**

According to the EIS, the existing environmental values for air were defined using meteorological data, climate, existing pollutant concentrations and the location of sensitive receptors. A site specific emissions inventory was developed for three operational scenarios based on planned production data. The likely impact on the sensitive receptors was predicted using air dispersion modelling for total suspended particulates (TSP), particulate matters less than 10µm diameter (PM<sub>10</sub>) and less than 2.5µm (PM<sub>2.5</sub>) and dust deposition. EIS Appendix I1, Air quality impact assessment, Table 8 summarised the project specific background pollutant concentrations for TSP, PM<sub>10</sub>, PM<sub>2.5</sub> and dust.

According to the EIS the nearest urban areas to the project site include Rolleston (16km west) and Springsure (58km south-east). Rural activities were stated as being the main land use around the project site. Emissions from farming activities were stated as including traffic on unsealed roads, cattle movement and ploughing. The EIS stated that these activities were the source of most of the background dust in the area surrounding the site. EIS Chapter 11, Air Quality, Figure 1.1 maps the location of the seven identified sensitive receptors. The seven receptors are farmland homesteads and are all more than 5km from the proposed pit operations. The three closest receptors (between 5 and 5.5km from the proposed operations) are owned by XCQ.

Long-term meteorological monitoring data from the BoM Rolleston station were used to determine project site conditions. Seasonal variation in meteorology at the project site was assumed to be similar to that recorded at the RCM site. Wind roses representing long term (1987 – 2010) average wind speed and direction at Rolleston were used in dispersion modelling. Winds at Rolleston were described as predominantly light to moderate from the south, east, and north, with a relatively high frequency of calms.

#### **4.8.2 Impacts**

The EIS stated that the air quality impacts from the proposed expansion project would include minor impacts from the proposed extra two coal trains a day, proposed 1.3% more jet flights per year, and a likely 35% increase in local road traffic.

The EIS also identified the mining activities that would be significant sources of dust included:

- excavating overburden by dragline
- loading trucks with overburden with excavators/shovels
- dumping on overburden dumps

- trucks hauling to and returning from overburden dumps
- loading trucks with coal by excavators/shovels
- trucks hauling coal to and returning empty from ROM dump
- dumping coal onto ROM dump
- coal processing activities
- loading and unloading coal stockpiles
- loading trains
- wind erosion on ROM stockpile/product stockpile/overburden dumps
- dozers moving coal
- dozers moving overburden
- drilling and blasting
- topsoil scraping
- grading.

Dust sources identified as minor were excluded from the EIS assessment including:

- wind erosion from areas of bare earth other than those listed above
- dust emissions due to light vehicle movement.

According to the EIS rail coal shipments to Gladstone via Aurizon's existing Blackwater Rail System would also generate dust emissions associated with wheel action on the rails and wind-blown dust from loads.

The EIS stated the results of the air dispersion modelling and air quality management study of the three project development scenarios as follows:

- no off-site impacts due to emissions from the project were predicted for TSP dust deposition and 24 hour average PM<sub>2.5</sub> concentrations
- annual average PM<sub>2.5</sub> concentrations were predicted to exceed the stated objectives at the XCQ owned Meteor Downs property
- exceedances of the 24 hour PM<sub>10</sub> objective were predicted at Springwood Homestead, Mount Kelman and Meteor Downs properties. The landowner for Meteor Downs, Mount Kelman, and part of the Springwood property (including the homestead sensitive receptor) is XCQ. It was stated there would therefore be no sensitive receptors that would be affected by air quality impacts from the project.
- blasting associated with mine operation would release fumes into the local airshed. These fumes would contain nitrogen dioxide (NO<sub>2</sub>), nitric oxide (NO) and carbon monoxide (CO) and may have a pungent odour and taste. The EIS stated that no fumes were likely to affect sensitive receptors.
- the project site isolation from sensitive receptors reduces the risk of significant dust and odour impacts
- noxious or offensive airborne contaminants resulting from the construction or operation activities, were stated as not likely to cause an environmental nuisance at sensitive receptors. The two main sources of potential odour nuisances were identified as the proposed the sewerage treatment plant and the storage of waste onsite, both in bins and transfer stations.
- combustion sources such as diesel engines were identified as the major sources of oxides of nitrogen and sulphur. No combustion pollutants would be sufficient to affect off site receptors. Such emissions from the project site were expected to be negligible. Oxides of nitrogen and sulphur were not addressed by the EIS Appendix I1, Air Quality Impact Assessment.
- no other significant air quality impacts were identified or anticipated.

### **4.8.3 Avoidance, mitigation and management measures**

XCQ proposed human health and wellbeing air quality objectives derived from Environmental Protection (Air) Policy 2008 (EPP Air) as project goals for the air quality assessment. This included goals for PM<sub>10</sub>, TSP, PM<sub>2.5</sub>, and dust deposition.

While PM<sub>10</sub> emissions were not expected to potentially cause offsite air quality impacts at sensitive receptors not owned and managed by XCQ during the life of the project, the project EM plan committed to a number of existing mitigation strategies aimed at managing offsite PM<sub>10</sub> impacts by reducing dust emissions from the project site.

These strategies were based on XCQ's current Air Quality Management Protocol (AQMP) (Xstrata Coal 2012). The strategies included:

- maintaining two PM<sub>10</sub> monitoring stations at the RCM located to the south and west of the current operations
- achieving 80% dust control efficiency on primary haul roads using chemical stabilisation and watering
- rehabilitating overburden dumps as soon as practical
- managing dragline movements for high dust emissions by minimising the dragline drop height
- water spraying system on ROM CHF transfers.

The EM plan also committed to continuing the following actions of the Aurizon Coal Dust Management Plan which currently apply to the load out facility for railing coal to Gladstone via Aurizon's existing Blackwater Rail System:

- applying veneer suppressant to the surface of loaded coal wagons
- load profiling for consistent coal surfaces in each wagon.

XCQ committed to managing air quality impacts to achieve EA conditions including:

- a monitoring and reactive management program
- commitment to project specific air quality goals
- development of real-time trigger values for identifying elevated dust events prior to any exceedance of the PM<sub>10</sub> 24 hour average project goals
- iterative approach to identifying and mitigating dust emission sources
- air quality objectives to be met at nominated sensitive receptors
- implementing compliance offsite dust monitoring program for quantification of actual impacts and active management dust emissions
- implementing the requirements of Aurizon's Coal Dust Management Plan (Aurizon 2010)
- undertake periodic review of trigger values and additional mitigation measures to minimise potential air quality impacts.

The EIS committed the proponent to implementing the XCQ procedure for Community Enquiry and Complaint Management as described in EIS Chapter 5, Appendix A2 and SIMP.

#### **4.8.4 Outstanding issues**

The dispersion modelling was based on a number of limitations and assumptions in the modelling methodology resulting in degrees of uncertainty including:

- assumptions in the published NPI and AP-42 emission factors used
- all activities assumed to occur continuously for 24 hours per day
- emission rates modelled as a constant rate for the duration of the modelled year while real emission rates are likely to be variable such as episodic emission rates from blasting activities.

Such uncertainties reflect the need for ongoing monitoring to verify real emissions by the project as it proceeds.

The existing EA for the RCM does not include a specific condition for TSP. EIS Chapter 11, Air Quality and EIS Appendix I1, Air Quality Impact Assessment did not identify offsite impacts due to TSP.

The emissions inventory (EIS Appendix I1, Air Quality Impact Assessment) did not identify combustion sources as a significant emission source. PM<sub>2.5</sub> monitoring and relevant EA conditions have therefore not been included in the EIS draft EM plan.

#### **4.8.5 Conclusions and recommendations**

The air dispersion modelling assessment reported in EIS Appendix I1, Air Quality Impact Assessment properly addressed the requirements of TOR.

The EIS adequately described the existing condition of the air shed, identified emissions sources and predicted the impacts of the project on air quality at a regional and local level. The assessment was based on several assumptions which were described in the EIS documents, particularly in regard to background air quality data, infrastructure locations and plant/equipment performance. XCQ committed to undertake site specific air quality monitoring when the location and design of project facilities have been determined.

The following recommendations provide advice on the key air quality issues raised during the assessment and the commitments proposed by XCQ.

### **Recommendation – EA application**

XCQ should further address air quality and management requirements of the EP Act. XCQ has committed to providing information relevant to air quality management to support applications for environmental authorities under the EP Act. The suite of information required under the EP Act is outlined in relevant EHP guidelines. In preparing an application for an amendment to an EA, XCQ should consider the EHP guideline – Application requirements for activities with impacts to air (EM960) and should ensure that the information provided in the application meets the requirements of section 125 and section 126 of the EP Act.

### **Recommendation – EA conditions**

XCQ should note that EHP would assess and impose relevant air emission conditions on the EA required by the project. These conditions would include requirements for monitoring and reporting. The recommended EA conditions are in Appendix A of this EIS assessment report. They are subject to the application process for the EA.

### **Recommendation – XCQ's commitments on air quality**

Where XCQ's commitments outlined in the draft EM plan do not conflict with any subsequent approval conditions and any recommendations of this assessment report, XCQ should implement the commitments as stated.

### **Recommendation – modelling update**

XCQ's site specific modelling of potential air quality impacts on sensitive receptors for defined project facility locations should be updated during operations and:

- use air emissions data for the specific design of equipment selected for the facility
- be completed prior to the completion of the first two years of operations
- be supported by local air quality data, where possible
- include emissions data for non-project sources that may result in cumulative impact.

## **4.9 Greenhouse gas emissions**

### **4.9.1 Existing values**

The EIS included an assessment of potential greenhouse gas (GHG) emissions by assessing historical fuel and energy consumption patterns at the existing RCM operation.

The main existing GHG emission sources from the mine include fugitive emissions from coal extraction, fuel combustion from transportation and stationary energy, and electricity consumption. Total reported GHG emissions for 2011 – 12 were estimated to be 317,300t CO<sub>2-e</sub> and 196,800t CO<sub>2-e</sub> for 2012 – 13. Fugitive emissions (mainly from methane) comprised 48.9% of all GHG emissions in 2011 – 12, but only 1.3% in 2012 – 13. The large reduction in GHG emissions was attributable to the different methodology used to calculate fugitive emissions in the 2012 – 13 reporting year. The National Greenhouse and Energy Reporting (Measurement) Determination (NGERMD, 2008) describes four calculation methods that corporations can use to determine GHG emissions. Method 2 was used for fugitive emissions based on a gas exploration drilling program undertaken at the existing RCM between April and August 2012 that showed the entire open cut area was a single gas domain. This low gas zone approach, as defined by the *National Greenhouse and Energy Reporting Act 2007* (NGER Act) measurement technical guidelines 2013, allows a significantly lower emission factor to be used for calculations than the default emission factor used by Method 1 in the previous reporting year.

### **4.9.2 Impacts**

According to the EIS, the likely activities of the project that would contribute to GHG emissions were divided into the construction and operational phases of the project. The likely sources of GHG emissions for the construction phase were not suitably addressed, such as the transportation of material to and from the site and the clearing of vegetation.

The operational phase of the project is anticipated to be the more significant regarding scope 1 and 2 emissions (direct and indirect operations) and a range of factors were calculated and tabled based on analysis of production data from the 2011–12 and 2012–13 financial years. GHG emission projections have been calculated using a best estimate based on a pro rata of the combined previous two years production data.

The projected GHG emissions associated with the operational phase of the project were summarised for four identified sources:

- fugitive emissions (e.g. methane) from the extraction of coal
- transportation from on-site machinery and equipment and transport of staff
- stationary energy
- electricity consumption.

The EIS estimated individual totals that were then combined to provide total projected GHG emissions (CO<sub>2</sub>-e in tonnes) for the project:

- year 7 (high activity) – 320,300
- average year over the life of mine – 256,600
- total life of mine (approximately 30 years) – 5,894,200.

These figures were then compared to the National Greenhouse Gas Inventory data that most recently recorded Australia's net GHG emissions in 2011. Australia's net GHG emissions were approximately 563.1 million tonnes of CO<sub>2</sub>-e in 2011. The annual scope 1 and 2 GHG emissions from the project are estimated to contribute 0.05% (in an average year) and 0.06% (year 7, high activity) to Australia's net GHG emissions. In relation to Queensland's net GHG emissions, the project's scope 1 and 2 operations emissions would contribute 0.16% (in an average year) and 0.21% (year 7, high activity).

Scope 3 emissions are indirect emissions resulting from the project's activities but occurring from sources not owned or controlled by XCQ (i.e. they are considered scope 1 emissions for the infrastructure operators). The transportation of coal by rail (from the mine to the Port of Gladstone) and shipping (assuming two thirds of the coal is exported to China and one third to South Korea) was calculated as was the end use of coal for power generation. These individual totals were then combined to provide total projected GHG emissions (CO<sub>2</sub>-e in tonnes) for the project:

- year 7 (high activity) – 42,533,100
- average year over the life of mine – 27,366,400
- total life of mine (approximately 30 years) – 629,388,800.

The average annual scope 3 GHG emissions from the project are estimated to contribute 4.85% (in an average year) to Australia's net scope 1 and 2 GHG emissions.

### **4.9.3 Avoidance, mitigation and management measures**

The EIS proposed a range of greenhouse gas abatement measures to reduce GHG emissions resulting from the project's activities. This includes:

- energy audits and education to raise awareness and improve energy efficiency
- legislative compliance with the NGER Act to record GHG emissions
- energy efficiency measures in the construction and operational phases
- fuel efficiency measures in the construction and operational phases
- vegetation offsets.

The EIS identified and summarised GHG emissions and committed to management objectives, including the following GHG abatement measures:

- use of a load and haul truck equipment fleet with fuel efficient diesel engines
- design and construction of the project best practice technologies, including energy efficient indoor and outdoor lighting, use of timers and or motion sensors on air-conditioning units, and installation of ceiling fans in common areas of the accommodation village
- fitting insulation in all ceiling and wall spaces in the accommodation village
- setting GHG intensity targets for each major processing or mining activity
- measuring, monitoring, auditing, reviewing and reporting the effectiveness of GHG reduction strategies and identifying further opportunities to improve the efficiency of energy use on site.

### **4.9.4 Outstanding issues**

The likely sources of GHG emissions for the construction phase of the project were identified, but not fully assessed in the EIS. The estimated GHG emissions from the construction phase of the project should be estimated and suitably assessed.

Despite the greenhouse gas abatement measures tabled in the EIS, there was incomplete addressing of the TOR as there was no specific module within the draft EM plan.

#### **4.9.5 Conclusions and recommendations**

The EIS concluded that the project would not result in significant long term impacts on local air quality. The combustion of coal would contribute 4.85% of Australia's scope 1 and 2 GHG emissions, though it is not clear how this would be considered in subsequent approvals.

It is recommended that the estimated GHG emissions from the construction phase of the project be estimated and suitably assessed. For example, land clearing, including woodland, wetland and grassland communities should be estimated using the impact area calculations from the proposed Offset Strategy.

It is also recommended that a specific module to address greenhouse gas abatement be included in the updated draft EM plan provided for the EA amendment process. The module should provide detail on the intended objectives, measures and performance standards to avoid, minimise and control GHG emissions.

### **4.10 Land**

The EIS described those aspects of the site and project related to the existing and proposed qualities and characteristics of the land including the landscape, topography, land use tenure and values of the project site, and surrounding local area.

#### **4.10.1 Existing values**

The project site and surrounding lands have been extensively grazed from 1850 to the present. Much of the area was cleared in the 1960's and in recent decades has been largely used for grazing on native vegetation, with some dryland cropping and minor forestry.

The EIS provided an adequate description of soil resources in the area, in response to the TOR. The project area is dominated by low undulating hilly country formed on Tertiary age basalts, which mostly give rise to red, red-brown and brown clay soils, which grade into dark grey soils downslope or in depressed areas. The basalts are weakly dissected by Meteor and Bootes creeks, as well as associated watercourses and drainage lines. Low steep scarps occur at the edge of the basalt terrain where Permian age sedimentary strata are encountered. These scarps give way to gentle or undulating slopes that merge into colluvial terraces with dark, cracking, self-mulching clay soils. There are substantial areas not suited to dryland cropping due to shallow soil depth and low resultant moisture holding capacity, though these can support grazing activities.

Low alluvial terraces and flats occur adjacent to Bootes, Sandy and Meteor creeks, which in some places have incised up to 15m into the Meteor Creek floodplain. Areas of lighter textured soils occur along recent levees, with texture contrast soils within a transition zone and deep cracking clays on the flat alluvial plains. The heavy clay soils are potentially suited to both long-term dry-land cropping and irrigated cropping subject to adequate water supply. The variability of the rainfall in the Central Highlands region provides the over-riding limitation to dryland cropping.

The EIS provided information on the extent of 'good quality agricultural land' within the project area. No land was rated as Suitability Class 1 for dryland cropping, i.e. with negligible limitations. However, 64% (7904ha) was rated as Class 2 or 3 (minor or moderate limitations for dryland cropping). Approximately 16% of the area has been rated as being marginal due to severe limitations for current and potential crops, while the remainder is considered to be unsuitable.

The entire project area has been included in a Priority Agricultural Area (PAA) in the 2013 Central Queensland Regional Plan, based on use of the area for dryland cropping which is classed a Priority Agricultural Land Use (PALU<sup>1</sup>). PAAs are strategic areas within which agriculture is the priority land use. Under the Central Queensland Regional Plan, any other land uses that seek to operate in those areas must co-exist with the priority land use.

---

<sup>1</sup> PALU is defined as a highly productive agriculture land use, including cropping, horticulture, irrigated agriculture and plantations. Non-PALU is an agricultural land use that includes grazing, production forestry, intensive animal husbandry and dairy.

The project land has also been assessed against criteria for strategic cropping land (SCL), which were established under the former *Strategic Cropping Land Act 2011* (SCL Act). Potential SCL was identified in MLA70416 and MLA70458 but not in MLA70415. Data from field investigations were evaluated against eight criteria (slope, rockiness, gilgai microrelief, soil depth, soil wetness, soil pH, salinity, and soil water storage) to determine whether land meets the SCL criteria. Of a total of 1813ha meeting the preliminary SCL trigger criteria, 263ha were excluded in the EIS on the basis of slope, soil depth and/or area size criteria.

Most of the land within the project area was assessed in the EIS to be suitable for grazing. However, sustainable grazing would require varying levels and intensities of management across different land suitability classes. Approximately 26% (3219ha) of the land was rated as Suitability Class 1 for grazing, and 33% rated as Class 2.

No acid sulphate soils or strongly acidic soils were identified in the area. The EIS noted that some overburden and interburden would be sodic and dispersive and be subject to surface crusting and high erosion rates if placed in the surface of spoil dumps or exposed directly to rainfall. A number of properties potentially contaminated by past agricultural uses were listed on the EMR but no sites were listed on the Contaminated Land Register.

The only identified mineral resource in the project area is coal. No other geological, geomorphological or paleontological features of note have been recorded in the area.

## **4.10.2 Impacts**

### **Coal resources**

The project would involve an extension of mining within areas of the existing ML70307, and the establishment of mining within MLA70415 and MLA70416, with open cut mining operations designed to extract the full economic seam. The mining sequence was proposed to preferentially target coal resources exhibiting low strip ratios in order to reduce processing costs and energy usage.

The EIS noted the potential conflict with the proposed adjoining Meteor Downs South mine, but the potential for sterilisation of coal resources at that site by this project was not assessed.

### **Other land uses**

The project site does not adjoin any incompatible urban land uses. The surrounding area is generally designated for agricultural or rural uses in the CHRC planning scheme, the nearest urban land use is the Rolleston Township.

Both the existing RCM and expansion project area mining leases adjoin Albinia National Park, while the project area also adjoins State forest. Impacts on ecological values are addressed in sections 4.14 and 5 of this EIS assessment report.

Springwood Road a stock route, passes through the project site intersecting ML70307, MLA70416 and MLA70458. The EIS stated that, while Springwood Road was gazetted as part of Queensland's stock route network, it is inactive. Realignment of Springwood Road would be required to enable the expansion of mining while maintaining public access. XCQ did not expect that movement of stock would be affected by the realignment.

Most ancillary infrastructure required for the project, such as powerlines, have already been constructed to service the existing operations at the RCM.

### **Agricultural land and productivity**

The project would involve both temporary and permanent impacts on agricultural activities and potential agricultural productivity. Whereas grazing activities would be displaced during mining, post-mining rehabilitation was proposed to re-establish conditions suitable for grazing across most of the affected footprint, with the primary exceptions of the residual mine voids, some steep out pit dumps slopes and the relocated Springwood Road. The project would result in a permanent loss of land potentially suitable for higher value agricultural uses (e.g. dryland cropping).

A number of submissions on the EIS expressed concern in relation to the impacts of the project on agricultural land resources and productivity in the Central Highlands region. Attention was drawn to the failure of the EIS to mention the Queensland Agricultural Land Audit (Audit). Part of the project area is located within the Central Highlands region identified in the Audit as one of three important agricultural areas in Central Queensland, as it has extensive cropping, high productivity grazing land and large areas of current and potential horticulture. The area is also designated as a PAA in the Central Queensland Regional Plan on the basis of its cropping and horticulture values. In response to submissions on the loss of high quality agricultural land, XCQ referred to the results of an earlier regional land resource evaluation and is not directly applicable under the current land use policy framework.

XCQ also acknowledged the requirement for further statutory assessment and approval (Regional Interests Development Approval (RIDA)) under the *Regional Planning Interests Act 2014* (RPI Act). Of the four categories of regional interest areas under the RPI Act, two are relevant to the project: the PAA and Strategic Cropping Area (SCA) requirements.

Dryland cropping has been identified as Priority Agricultural Land Use (PALU) on 207ha. Of the 5629ha of agricultural land use within the project footprint, 5417ha was identified as grazing (non-PALU) and 5ha as production forestry. Proposed rehabilitation to a condition suitable for grazing was predicted to create a temporary loss of an estimated 5147ha of non-PALU grazing land.

The co-existence principles established by guidelines under the RPI Act require the demonstration of how a project would be mutually beneficial to agricultural interests and resource activities, how interruption of agricultural productivity would be avoided and how positive flow-on benefits for the agricultural supply chains would be achieved. These matters were not assessed as part of the EIS but must be addressed as part of the RIDA process under the RPI Act.

DAFF has advised EHP that there should be no net loss of agricultural land or production and hence XCQ should ensure that both PALU and non-PALU land equivalent to that permanently impacted be maintained, in perpetuity, and further that equivalent land for that temporarily impacted land be maintained as a non-PALU for the term of the project. In addition, DAFF considers that the proponent should provide an 'uplift measure' to ensure the ongoing development of agriculture in the region.

The RCM and areas of the project site lie within the SCL Western Cropping Zone. The criteria applying to the identification of SCL have been retained under the RPI Act. According to the EIS, which was prepared in the context of the SCL Act, the potential impact on SCL would depend substantially on which option is adopted for the realignment of Springwood Road. Preliminary estimates based on worst case development impacts were for:

- 445ha with the inclusion of Springwood Road Option 1 (about 8% of the project footprint)
- 257ha with the inclusion of Springwood Road Option 2 (about 4.5% of the project footprint).

#### **Land contamination**

A range of project activities, including coal handling and transport and refuelling, have the potential to generate land contamination. These contamination risks were proposed to be managed through standard on-site procedures in accordance with the EP Act.

#### **4.10.3 Outstanding issues**

The RIDA process under the RPI Act would set out the required mitigation process for project impacts on PAA and SCA, should the project proceed.

It is recommended that XCQ continue to liaise with the DSDIP, DNRM and DAFF to discuss and resolve these outstanding matters prior to the commencement of construction for the expansion project.

#### **4.10.4 Conclusions and recommendations**

The project would result in significant disturbance of agricultural land and would interrupt existing cattle grazing and some cropping land on the mine site itself. Some impacts of the project would be temporary over the life of the mine, while others were identified as permanent. The rehabilitation aim for the majority of the site is to reinstate a land condition similar to the pre-mining land use of low intensity cattle grazing. Riparian vegetation and habitats would be re-established along the creek diversion consistent with the specified outcomes for the diversion. Confirmation of the rehabilitation success of the mine site and creek diversion would be fully assessed at the end of mine life.

Mining for the project would result in significant changes to landforms, drainage and soils within the project area. The temporary land use change from agriculture to mining would revert to grazing activities across the majority of the project area as rehabilitation is progressively completed. Areas within the project site outside the project footprint would not experience significant changes in landform or use. Significant changes in land use outside the site as a result of the project area are not anticipated.

The EIS provided sufficient evidence that the project could proceed without a significant long-term impact on agricultural land use activities and productivity in the region, if:

- effective rehabilitation following mining occurs to enable on-going grazing within the area of the project footprint, excluding the residual mine voids
- appropriate mitigation of impacts on agricultural resource values and productivity is implemented in accordance with the requirements of a RIDA under the RPI Act.

It is recommended that any EA for the project require specific rehabilitation success criteria to ensure that the appropriate environmental values and pre-mining land use is achieved post mining.

Recommended land management conditions are provided in Appendix A of this EIS assessment report.



#### **4.10.5 Resource utilisation**

The EIS adequately described the extent of the coal resource, defined the resource base and production schedule and mining sequence and stated that the mine plan and design had been developed so as to ensure that no coal resource would be sterilised by the project.

### **4.11 Waste management**

Mine waste management was discussed in Chapter 8 of the EIS. A geochemical characterisation study for the project, presented in Appendix F-1 of the EIS, evaluated the chemical and physical properties of the waste rock, subsoil and coal seams; the potential for acid, neutral or saline discharge from mineral waste rock generated by project operations; and the potential quality of leachate from mined waste (overburden, interburden and crushing waste).

#### **4.11.1 Waste rock characterisation and quantification**

According to the EIS, the results of the geochemical characterisation of waste rock, soil and coal indicate the following:

- waste material generated by the project generally would likely be non-acid forming (NAF), sodic and dispersive, and enriched in some metal/metalloids (in particular by selenium)
- mild potential acid forming (PAF) characteristics were found in material adjacent to coal seams or between seams (roof, floor and interburden material)
- the net acid-generating potential (NAGP) of the roof/floor and interburden material and the NAF of overburden material, along with the sodic characteristics of material, was consistent with the previous study undertaken of the existing RCM area in 2002 (refer Rolleston Coal Mine EIS – Appendix D)
- testing demonstrated that acid neutralising capacity (ANC) could overestimate the neutralisation potential that is available immediately to buffer the pH to above 6 (i.e. to prevent the onset of acid-generating conditions) and also during acid-generating conditions (i.e. at pH 4), suggesting that the ANC balance is predominantly associated with magnesium and iron carbonate minerals (e.g. ferroan dolomite, magnesite and siderite)
- the estimated high proportion of NAF to PAF/uncertain acid-forming potential (UC) material (>20:1) indicated that there would be sufficient ANC to buffer any potential acidity generated, subject to appropriate co-placement of the PAF/UC with NAF material.

#### **4.11.2 Mine waste inventory**

Waste produced at the mine would broadly include mine wastes (overburden, roof/floor, interburden and soils); and general and recyclable wastes from the mine site and the accommodation villages, including building, timber, liquid wastes (including sewage) and regulated wastes. An inventory of the expected waste streams and forecast quantify from each mining phase was provided in the EIS.

Waste would be produced during the construction, operation and decommissioning phases of the project. The main waste generated during construction would be associated with vegetation clearing and earthworks. No tailings would be produced during the mine operation as the project does not propose coal washing. The majority of the waste produced by volume during the operational phase would come from overburden material.

Green waste and topsoil were considered to be resources rather than waste and would be collected throughout the mine life to be used for rehabilitation purposes.

Projected project carbon dioxide emissions at the site over the life of the mine were forecast to reach 5,894,200t (CO<sub>2-e</sub>).

#### **4.11.3 Impacts**

The EIS noted that exposed waste rock stockpiles containing acidic or alkaline soils could increase the potential for erosion and acid leachate. Overburden stockpiles that were incorrectly consolidated or designed could potentially settle inconsistently, release sediment and could lead to structural failure of the containment facility. Under leaching conditions, trace metals that exceeded the relevant release contaminant trigger values for arsenic, chromium, molybdenum, selenium, uranium, vanadium and copper, were detected in soil samples.

General municipal waste and sewage have the potential to impact on the amenity of the project area and surrounding environment and could increase hazards to human and ecological health. Waste water generated by the sewage treatment plant, would be pumped to the pit water dam for re-use as dust suppression on haul roads.

Mine water management would segregate clean and dirty water by ensuring water that has contact with pits, coal stockpiles, hardstands, workshop areas, overburden dumps and haul roads is separated and directed into adequately sized dams.

According to the EIS, the proposed project would contribute an additional 2400t/yr of general municipal waste to local landfills.

No significant adverse impacts were expected from the storage and disposal of waste oils, hydrocarbon contaminated waste, or solvents, paints and chemicals if appropriately managed.

Inappropriate storage and disposal of tyres were identified as a significant fire risk with potential smoke impacts on human health (due to toxic emissions) and greenhouse gas emissions. Water used to extinguish tyre fires could cause significant environmental impacts if released to waterways. Poor storage and disposal of waste tyres could cause ponding of water which may enhance mosquito breeding. Tyres could also leach contaminants, such as heavy metals into the environment if not managed correctly.

Improper storage and disposal of large quantities of batteries was also identified as a risk to the environment due to toxic material content.

However, the EIS also identified how these potential impacts could be managed to ensure actual impacts would be acceptable and manageable.

#### **4.11.4 Avoidance, mitigation and management measures**

XCQ committed in the EIS to implement a best practise waste management program and to exploring opportunities for cleaner production where practical and feasible, through the following techniques:

- process design, by maximising the recovery efficiency and by-product values
- input substitution, by reducing toxicity or increasing renewables in the process
- modification of production processes, by use of best technologies, designs and unit operations
- improvement of operation and maintenance, by use of most appropriate processes and equipment
- reuse, recovery and recycling of waste streams such as recycling of glass, aluminium, hydrocarbons, timber, steel, plastics and cardboard
- closed – loop recycling, by re-use of products after recycling.

Excavated rock produced during mining operations would be placed in overburden stockpiles. As there was predicted to be an excess of ANC material available for acid neutralisation and likely that the leachate generated from waste rock would be alkaline, the co-disposal of near seam and interburden material and overburden within a waste rock enclosure would be likely to be an acceptable practice, provided standard environmental controls, and appropriate monitoring and management procedures were in place. As some of the overburden and interburden would be both sodic and dispersive, suitable measures would need to be implemented to prevent excessive erosion and sedimentation impacts on nearby waterways.

EIS Chapter 8, Table 8.3 presented the proposed mitigation strategies for all other wastes.

In order to surrender the mining lease at the end of the mine life, the hardstand areas, haul roads, access tracks, infrastructure such as plant and buildings and water related infrastructure such as dams, levees and diversions would have to be decommissioned. A hazardous materials survey and contaminated land assessment was proposed to be undertaken prior to infrastructure demolition, in order to identify the presence of hazardous materials and inform appropriate management and disposal.

#### **4.11.5 Outstanding issues**

No major issues relating to waste management were raised in submissions on the EIS.

#### **4.11.6 Conclusions and recommendations**

The project would be an expansion of the existing RCM, where waste management policies, plans and procedures are established. Suitable facilities for the transportation and holding of waste are also available. EHP accepts that the residual impacts of project waste are unlikely to be significant where waste management for the proposed project complied with legislative requirements.

The EIS adequately addressed the waste identification and management requirements of the TOR. The overall commitment to apply and implement waste management principles in accordance with applicable legislation has been adequately demonstrated. The waste hierarchy has been appropriately identified and, generally adopted for identified waste streams, and reflected in general management measures. Specific waste management measures are proposed to be developed to ensure that the waste hierarchy would be effectively implemented during mine operations.

## Recommendations

The following recommendations provide advice on the key waste management issues raised during the assessment and the commitments proposed by XCQ:

- XCQ should liaise with CHRC to negotiate the type and volume of waste to be delivered to the Lochlees council landfill or the most efficient and cost effective location as determined by the waste disposal contractor
- when applying for an EA for the project, XCQ should provide further details and maps showing design and location of the proposed sewage and waste management system in the context of all proposed project infrastructure on-site, including the location of any proposed sites to be used for irrigation of waste to land.

Recommended waste management conditions have been provided in Appendix A of this EIS assessment report.

## 4.12 Surface water

### 4.12.1 Hydrology and environmental values

The project is located within the catchment of Meteor Creek, a tributary of the Comet River, within the Fitzroy River Basin. The upper reaches of the project site are steep and well vegetated, with elevation increasing from about 220m above Australian Height Datum (AHD) in the east to 350m AHD in the west.

Three watercourses – Meteor Creek, Sandy Creek and Bootes Creek – as well as three drainage features – Gibbs Gully, Spring Creek and Paton's Spring Gully – flow through the project site. These streams are ephemeral with little or no flow between April and November and high flows in the summer months. Flows are observed after periods of medium to high rainfall.

Meteor Creek originates about 60km upstream of the project site near the ranges of Carnarvon National Park. It flows generally in a north-east direction, through MLA70458 and MLA70416. Sandy Creek, a tributary of Meteor Creek, originates in state forest to the west and then flows east. On the floodplains, where grades are flatter and stream power is lower, meanders and increased sinuosity of the watercourses occur. Sandy Creek channel acts as a flood runner for Meteor Creek with the two streams effectively draining the same floodplain.

A large number of farm dams have been constructed within the Meteor Creek catchment to support agricultural activities, primarily cattle grazing, altering the hydrology within the catchment. Land clearing and grazing has also contributed to erosion in some areas.

Environmental values (EVs) for the Comet River sub-basin are identified in the Comet River Sub-basin Environmental Values and Water Quality Objectives (EHP, 2011), recognised under Schedule 1 of the Environmental Protection (Water) Policy 2009 (EPP (Water)). Waters within the project site have been assigned a management intent of moderate disturbance of aquatic ecosystems in accordance with the Comet River Sub-basin Environmental Values and Water Quality Objectives, which is applied to waters which are adversely affected by human activity to a relatively small but measurable degree.

While the aquatic ecology component of the EIS concluded on the basis of surveys in 2010 and 2012 that creeks with the project area 'are generally in a poor to moderate condition', a stream health survey of upstream and downstream sites on Bootes Creek and Meteor Creek conducted in 2012 as a requirement for the EA for the RCM and not reported in the EIS found that:

*'... stream health at all sites was better than most inland sites in the Fitzroy basin. The Bootes Creek upstream site in particular stood out as being in near pristine condition while the Bootes Creek downstream site exhibited minor, but distinct, environmental impairment due to the presence of a lignum swamp upstream and/or mine activities.'*

Notwithstanding the conclusions of the EIS, it is likely that significant environmental values, warranting ongoing protection, do occur through the waterways in or adjacent to the project site, consistent with the management intent under EPP (Water).

The EIS noted the high ecological value (HEV) areas present immediately upstream (HEVa2122 and HEVa2123) and, more importantly, within Albinia National Park (HEVa2124) downstream of both the RCM and the project site, but did not address the implications management of this designation under the Comet River Sub-basin Environmental Values and Water Quality Objectives.

Rolleston's town water supply is drawn from the Comet River upstream of its confluence with Meteor Creek.

#### **4.12.2 Impacts on surface water resources**

XCQ proposed to apply strategies currently used at the RCM to minimise detrimental impacts on surface water resources due to the project, including strategies to:

- minimise and stage land disturbance
- divert clean water around operational areas
- contain and transfer stormwater inflows
- control the discharge of mine-affected water
- progressively rehabilitate disturbed areas.

The EIS indicated that final engineered landforms within the project area would minimise catchments draining to residual voids, in order to reduce inflows, while their slopes would be stabilised and shaped to minimise erosion, maintain water quality and divert clean water from the site.

Surface water associated with the RCM is currently managed through the Rolleston Coal Water Management Plan (WMP), which was revised in 2010 – 11 in response to major flood events. That plan addresses water use, water accumulation and water management on site with the aim of minimising the quantity of pit water that is released to the environment. The RCM WMP describes the site's Water Management System (WMS) for the capture and management of all runoff and intercepted groundwater from disturbed areas. Key components of the WMS are:

- bunds and drains to divert overland flow from undisturbed catchment areas around the site in order to preserve stream flows and prevent the accumulation of mine affected water
- sediment dams to capture overland flow from disturbed catchments prior to rehabilitation
- storage dams for mine affected water with infrastructure to allow preferential reuse of mine affected water as well as controlled releases in accordance with EA conditions
- Naroo Dam captures catchment inflows to supply the RCM accommodation village and workshop.

Building on the RCM, the project would require new infrastructure in order to minimise environmental impacts, including:

- several flood protection levees, including one to protect the Meteor South (A) and (B) pits from flooding from Sandy/Meteor Creek
- Sandy Creek diversion channel to divert flows toward Meteor Creek to the south east of the Meteor Creek levee
- drainage realignments to divert flows around undisturbed catchments around the western pits, including the stages 1 and 2 of the Bootes Creek diversion channel to redirect flows away from Spring Creek Pit and redirect flows to the Gibbs Gully Pit, West Pits 1 to 4
- Western Release Dam and three other dams to allow water from mining operations to be stored, reused and released under controlled conditions. As well as the six existing release points, three new mine water release points are proposed initially with others to be added later.

According to the EIS, the levee heights required to achieve design objectives, for both new levees and proposed levee raises, would be feasible and effective to protect working pits and final voids from a 1000 year ARI event.

The EIS indicated that mining of the Meteor South pits would require removal of a 5.25km section (measured linearly) of Sandy Creek. Diversion of this creek into Meteor Creek upstream of the future mine pits is proposed, as well as a levee around the perimeter of the pit area to protect the mine from floods (see Figure 9-2 of EIS chapter 9). Similarly, since Bootes Creek flows through MLA70415, the development of the western pits on MLA70415 and ML70307 would require the removal and diversion of a 10km section of Bootes Creek in two stages.

The EIS stated that the advanced designs for the diversions are consistent with relevant guidelines with respect to hydrological, hydraulic and other characteristics. It is expected that the re-alignments – with the use of appropriate mitigation strategies – would allow the streams to continue to exist in a dynamic equilibrium with existing instream, adjoining and downstream environments. Proposed strategies include the use of rock armouring upstream of the Sandy Creek diversion, to address locally increased shear stresses, and establishing vegetation to minimise erosion. At the same time, the design for this diversion would aim to promote a mobile, active channel within a 150m corridor.

The Water Resources (Fitzroy Basin) Plan 2011 (WRP) provides a framework for sustainable management of water. The WRP defines the availability of water in the entire Fitzroy Basin area and identifies priorities and mechanisms for dealing with future water requirements. The associated Fitzroy Basin Resource Operations Plan 2011 (ROP) sets out the rules to guide the allocation and management of water required to achieve the objectives set in the WRP, including for environmental flows and water allocation security. The WRP and ROP identify that no additional unallocated water is available in the streams located near the project. The ROP specifies that any water licence issued under mining tenure must be limited to enabling the removal of mine seepage or runoff that is unavoidably being discharged or proposed to be discharged into a watercourse. No additional surface water entitlements, beyond those currently held for the RCM, are presently able to be obtained under the ROP.

The amended EIS stated that a shortfall in raw water supplies may occur in the final eight years of the project mining. DNRM has advised that if this deficit cannot be overcome through efficiency improvements or use of water from the mine voids and existing entitlements, XCQ may need to seek access to currently unallocated water.

XCQ would rely on water captured within its Naroo Dam. Naroo Dam could be impacted in the future by the adjoining MDS mine proposal that is being advanced by U&D Mining. This matter is being considered by the Land Court and is not resolved in the EIS.

### **4.12.3 Impacts on surface water quality**

The assessment of baseline water quality in the EIS relied on limited monitoring data from four monitoring points:

- a site on Meteor Creek at Springwood 10km upstream of the project, and another on the Comet River at The Lake 25km downstream of the project, both which were formerly monitored by EHP mostly on a quarterly basis
- two sites upstream of the RCM area, on Bootes Creek and Meteor Creek, that were monitored by XCQ before and after rainfall events over several years.

Table 17 in Appendix G-1 of the EIS stated the 80<sup>th</sup> percentile level for total suspended solids (TSS) at the upstream Springwood site as being 57mg/L, whereas the other three sites yielded 80<sup>th</sup> percentiles in the range of 906 to 1514mg/L.

The presence of Albinia National Park (HEVa2124) immediately downstream of MLA70416 means that the quality of discharges of mine-affected waters from the project would need to be consistent with achieving the WQOs for HEVa2124. The applicable WQOs under the EPP (Water) Comet River Sub-basin Environmental Values and Water Quality Objectives are to 'achieve effectively unmodified water quality (20<sup>th</sup>, 50<sup>th</sup> and 80<sup>th</sup> percentiles for HEV waters), habitat, biota, flow and riparian areas'. While Meteor Creek upstream of Albinia National Park is currently affected by RCM discharges from Release Point 5 on Sandy Creek, the setting of discharge requirements for the project to meet those objectives would need to take account of both existing catchment influences and practicable outcomes from best practice environmental management.

In the absence of data from a suitable unmodified reference site, the EIS adopted the default approach in the Australian and New Zealand Guidelines for Fresh and Marine Water Quality (2000) of using the 20<sup>th</sup> and 80<sup>th</sup> percentiles in seeking to define release values to provide for the protection of moderately disturbed waters.

In its response to EHP's submission on the EIS, which highlighted the issue of WQOs for HEVa2124, XCQ provided evidence that water quality in Bootes Creek for key parameters during 2007–2012 was poorer immediately upstream of the RCM compared with downstream values, with the exception of TSS which was similar. On this basis, XCQ suggested that catchment features such as geology and land use have a dominant influence on receiving water quality. However, the Receiving Environment Monitoring Plan prepared by a consultant for XCQ in 2010, though not reported in the EIS, commented that the observed decline in 80<sup>th</sup> percentile TSS from upstream to downstream 'may indicate that the site of sampling is affecting the suspended solids results, or that the addition of release water is having an effect on the suspended solids results within the receiving waters'. This statement is indicative of some uncertainty about the appropriate establishment of baseline water quality conditions in the project waterways that still needs to be resolved.

The existing RCM EA conditions for release of mine-affected water were amended in 2011 to incorporate conditions based on the Model Water Conditions for Coal Mines in the Fitzroy Basin (EHP, 2011); these essentially involve end-of-pipe concentration limits for an array of indicators and specify the allowable ratio of discharge volumes to natural flow. Releases are only allowed under specified flow conditions and the EIS stated that discharges in practice have normally followed high-flow events.

For this project to be acceptable mine water discharges must be rigorously controlled to ensure that identified receiving water quality values are maintained and relevant water quality objectives are met.

The EA conditions for RCM had set a TSS limit of 1200mg/L for releases of mine-affected water. The draft EM plan accompanying the EIS proposed an adjustment for Bootes Creek to limit releases to a TSS concentration of 1050mg/L. No change to volumetric discharge rates was proposed.

The EIS stated that the proposed limits for project discharges into Bootes Creek and Meteor Creek respectively are comparable to the 'background' 80<sup>th</sup> percentile levels for TSS. A TSS trigger level of 1300mg/L in receiving waters was proposed. Since monitoring of TSS requires laboratory testing, XCQ proposed to use onsite measurement of turbidity to complement TSS data, in order to guide releases of mine-affected water. XCQ proposed to undertake monitoring of TSS and turbidity in order to establish a correlation and define turbidity triggers. Turbidity triggers have not yet been established under the existing EA for the RCM. The current EA also requires release rates for salinity to be revised on the basis of further monitoring of background conductivity. The results of that action were not presented in the EIS.

Under the existing EA conditions for RCM, if the trigger levels for receiving waters are exceeded, and downstream results exceed those upstream, XCQ must provide a report to EPH on any potential environmental harm. Action to address exceedances would be in accordance with the EMP and a plan of operations. Appendix G-1 in the amended EIS stated that triggers defined by the receiving environment monitoring program (REMP) would be used to guide adaptive management during construction, when site disturbance is likely to be most extensive. The EIS proposed a number of measures to control erosion and limit sediment in runoff associated with the project in order to protect water quality.

#### **4.12.4 Impacts on hydrological and hydraulic conditions**

To support understanding of the flooding characteristics of waterways within the project site, as well as project design, hydrological modelling was undertaken to determine the flood discharges for a range of storm events from 2 to 1,000 year ARI, and the probable maximum flood (PMF). XP-RAFTS software was used to model runoff in local catchments, with calibration against observed rainfall and stream flow data for historical flood events.

The hydrograph outputs of the hydrological modelling were used as inputs into hydraulic modelling of existing watercourses through the project site. Hydraulic modelling was undertaken to determine existing hydraulic characteristics of the active channels and floodplains associated with each watercourse. The baseline waterway hydraulic characteristics assessed were flood extents, water depths, flow velocities, shear stresses and stream powers, for a range of design flood events.

A one-dimensional hydraulic model was used to assess flooding impacts for the western part of the project site (refer to Figure 9.10 of EIS chapter 9 for hydraulic model boundaries). Responding to IESC concerns, XCQ stated that use of a one-dimensional hydraulic model is appropriate for this area since the creeks are incised, the flow paths are well defined, and the modelled flood extents are confined within the natural topography.

A two-dimensional hydraulic modelling was used to assess impacts on the southern part of the project site, because of the broad flooding across the floodplain, involving complex interaction between Sandy and Meteor Creeks, especially for the larger events. In the absence of historic water level records, modelled flood events were compared with flood extents for the 2010 flood. A sensitivity analysis was conducted to confirm the model's robustness.

Results from hydraulic modelling for the 100 year ARI event showed a maximum afflux of 3m adjacent to the Meteor Creek levee, as a result of constriction of the floodplain area adjacent to the Meteor Creek levee and the transfer of water from the floodplain of Sandy Creek to Meteor Creek. This afflux would not affect housing or industrial properties and would not extend off lease. The modelling results indicated that, at the downstream model boundary (4km downstream of Meteor Creek levee), there would be no significant change in flood levels across the floodplain, with a slight reduction in flood levels in the creek for the 100 year ARI event. Allowing for a 10% increase in rainfall (as a result of climate change), the increase in flood levels was predicted to remain within the levees' proposed freeboard, based on the 1000 year ARI event design criterion.

For the 2 year ARI and 50 year ARI events, the hydraulic model predicted that stream velocities and shear stresses would generally be within design limits for stream stability and therefore the waterways would not erode at a greater rate than currently (the EIS noted that erosion and sedimentation are occurring within the existing waterways, which are laterally mobile). A key exception was the predicted increase in shear stresses along Meteor Creek for 400m upstream of the confluence with the Sandy Creek diversion. This would occur due to the expansion of flows into the wider diversion causing a drop in water depth and a resultant increase in shear stress. The EIS stated that management measures would be required to stabilise creek banks in this section.

The existing Springwood Road alignment has a low level crossing with flood immunity of less than a 1 in 2 year ARI. Springwood Road is proposed to be realigned with the final design commitment to provide a similar level of flood immunity.

The EIS provided a high-level assessment of the project's impact on surface water baseflows. Currently, as an ephemeral stream, average annual baseflow in Meteor Creek contributes only 2% of average annual streamflow. The EIS predicted that the project would have only a minor impact on surface flows in Meteor Creek at its junction with the Sandy Creek diversion. It stated that the small loss of catchment area together with the reduction of baseflow from groundwater were predicted to result in no change to peak flows, little if any change to average daily flows greater than 0.1m<sup>3</sup>/sec, but an increase from 74 to 131 in no-flow days a year. The EIS also predicted that baseflow would be permanently eliminated in the middle reach of Meteor Creek, due to pit dewatering, but would recover in the lower reach beyond the confluence of Bootes Creek and Meteor Creek.

The IESC commented that the range of uncertainty in modelling predictions may not be accurately quantified due to limitations in stream gauge data and calibration events.

The IESC disagreed with the EIS conclusion that residual impacts of the project on surface waters would be limited to loss of catchment, water quality and flooding afflux. Additional, potential impacts were identified by the IESC as being:

- changed flow regimes (reduced baseflow) within Sandy Creek and Meteor Creek due to groundwater drawdown with possible ecological consequences, in particular to a significantly increased number of 'no flow' days
- potential destabilisation of creek diversions, waste rock dumps and levees
- alteration of the geomorphology of Meteor Creek adjacent to, and potentially downstream of the Meteor [Sandy] Creek diversion.

The EIS stated that independent certification of the designs for the creek diversions (in accordance with section 20(4) of the Water Act and the DNRM guideline - Works that interfere with water in a watercourse: watercourse diversions - should provide substantial confidence in their stability. XCQ also clarified that waste rock dumps would be set back from waterways, and hence there would be no specific risk of destabilisation by flow events.

QPWS expressed particular concern for the downstream stability of Meteor Creek, as well as the maintenance of flows and water quality to support existing environmental values of Albinia National Park. QPWS sought assurance that the Sandy Creek diversion would not adversely impact on downstream water quality during construction and in the longer term, that natural flow regimes would be maintained, and that adequate monitoring and corrective action for downstream water quality would be implemented. The EIS did not provide a comprehensive response to these concerns. However, the statutory requirements for the mandatory outcomes of the diversion of Sandy Creek would ensure the accountability of XCQ to maintain the physical stability of the watercourse.

#### **4.12.5 Impacts on ecological conditions**

Changes to the hydrology and water quality of Meteor Creek that could result from the project have the potential to impact on aquatic ecology as well as on riparian GDEs. The IESC had reservations about the adequacy of the EIS's assessment of potential impacts from the project on aquatic ecology and stated that the evaluation of groundwater drawdown-induced changes to the hydrology of Meteor Creek should be incorporated in the assessment of residual surface water impacts on water related assets, including the aquatic values in the Albinia National Park. The EIS anticipated that aquatic ecosystems in affected waterways would be resilient to increased no-flow days, in part on the basis that extensive dieback in the area has not been observed following previous extended periods of low flow. Further grounds for this conclusion noted in the EIS were the results of regional ecological studies of comparable ephemeral stream systems in central and coastal Queensland, whose ecological character is driven by regeneration following wet season high flows in a 'boom and bust' cycle. The EIS concluded that reduced baseflows present an insignificant risk to the maintenance of the health of affected tree species. Notwithstanding the concerns of the IESC, having regard to relevant regional studies of ephemeral ecosystems, the claim in the EIS that the predicted increase in no-flow days in the lower reach of Meteor Creek including Albinia National Park would not significantly impact on either aquatic ecology or riparian GDEs is accepted here.

While the EIS stated that discharges of mine-affected water from the RCM to date have not adversely affected the ecology of downstream watercourses, it is considered that the EIS investigations were insufficient to support a conclusion that potential changes to both water quality and flows in Meteor Creek as a result of the project would not have adverse downstream impacts. Only if the receiving water quality is similar to that being discharged could there be confidence that the HEV values within Albinia National Park would not be compromised.

#### **4.12.6 Impact monitoring and management**

The current EA conditions for the RCM require the EA holder to develop and implement a 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.

While the EA conditions elaborate some technical aspects of monitoring under the REMP, the draft EMP outlines the REMP as involving:

- monitoring project impacts on downstream waterways, particularly on aquatic ecosystems
- informing continual improvement of the mine's EMP and plan of operations
- triggering a requirement for remedial action should an impact be detected.

Appendix G-1 in the SEIS stated that exceedance of the downstream 50<sup>th</sup> percentile low flow triggers and 80<sup>th</sup> percentile high flow triggers for turbidity and TSS would require site activity to cease, and erosion and sediment control measures to be reviewed and revised, while exceedance of the 75<sup>th</sup> percentile trigger for electrical conductivity would also require site activity to cease.

The IESC made the following recommendations in relation to monitoring of surface waters:

- relocation of upstream monitoring stations to locations upstream of all known mechanisms of potential impact (from RECP and RCM), including groundwater drawdown and potential seepage from mine dams and landforms
- establishment of background aquatic ecosystem values prior to commencement of dewatering or ground disturbance works for the project to ensure background values are not influenced by project activities.

The IESC also suggested that the REMP be designed to:

- measure seasonal and inter-annual variations in hydrology and water quality within Bootes Creek, Sandy Creek and Meteor Creek
- measure seasonal and inter-annual variation in the health of aquatic and groundwater dependent ecosystems.

These recommendations of the IESC are considered appropriate. Particular attention during the background assessment phase should be paid to establishing suitable background water quality sites to ensure derived water quality triggers are appropriate.

#### **4.12.7 Conclusions and recommendations**

##### **4.12.7.1 Surface water**

The water quality discharge limits proposed in the EIS may not be optimal in terms of protecting the aquatic values of watercourses passing through Albinia National Park in the long-term.

The standard criteria under the EP Act are mandatory considerations for both the making of assessment reports and decision-making on EAs. Relevant criteria include:

- conservation of biological diversity and ecological integrity, as a fundamental consideration in accordance with the Intergovernmental Agreement on the Environment
- the character, resilience and values of the receiving environment
- best practice environmental management for activities.

Having regard to the standard criteria, EHP considers any EA for the project must provide for the protection of the ecological values of Meteor Creek, particularly within that section passing through Albinia National Park.

During the development of this assessment report, it became apparent that there are water quality data and reports additional to those applied in the EIS that should also be considered when determining specific water quality discharge criteria. Compilation and interpretation of the full suite of existing water quality data would assist in establishing appropriate background water quality conditions on which to base trigger levels for proposed releases. However, in light of the IESC's above recommendations, additional data is likely to be needed.



The order of priorities in establishing the conditions for mine-affected water releases should be:

- preservation of the values of the receiving watercourse and including the HEV area of Albinia National Park as required under the EPP water
- contemporising existing conditions by implementing the appropriate aspects of the model mining conditions.

In addition to TSS and salinity/conductivity, all relevant indicators should be considered having regard to the both the discharge and the receiving environment downstream.

Noting the apparent deterioration in water quality between the monitoring points on Meteor Creek at Springwood (130508A) and at MP2, implementation of the project would warrant effective control and enhancement of the quality of both mine discharges and on lease catchment run-off to protect aquatic and riparian ecosystems, especially within and adjoining Albinia National Park.

Prior to establishing water quality discharge criteria for the project it is recommended that the following steps be applied:

1. a robust baseline assessment of environmental values within affected watercourses
2. compilation and interpretation of all available relevant water quality data
3. establishment of appropriate WQO and discharge conditions to protect the environmental values of affected watercourses including aquatic ecological and riparian values in the section of Meteor Creek passing through Albinia National Park
4. application of the baseline assessment to both design and justify a suitable REMP
5. development and progressive implementation of an integrated site and water management plan for the whole of the project and RCM Mining Lease/Mining Lease Application area. The objective of this plan would be to support the achievement of WQOs to the extent this is influenced by all activities within this area. This plan would include measures to manage impacts on watercourses, including downstream of the Sandy Creek diversion and all mine-affected discharges and runoff during the period of mine construction, operation and rehabilitation.

## 4.13 Groundwater

### 4.13.1 Existing values

The EIS provided a conceptual model of the hydrogeology of the project area, which indicated the general relationship between geological units and hydrological interactions (see Figure 4 and Figure 5 in this EIS assessment report).

The project area is largely covered by an extensive blanket of Tertiary basalt, consisting of multiple flows, which overlies Permian strata composed of sandstones, mudstones, shales and coal beds. The basalt caps the steeply eroded escarpments that are cut into the softer underlying sediments.

The EIS stated that the regional groundwater system is typically located within compartments of deeper fresh basaltic rock that have sufficient permeability and which are also hydraulically isolated from shallow or perched aquifers by massive fresh rock or clay zones. Some surrounding rural properties have bores into the regional groundwater system, generally within basalt. The existing RCM pits have intersected thin, elongated paleochannels of sediment and basalt, as well as fractured upper zones of basalt, which are saturated by groundwater to varying degrees until seepage and pumping from the pits depletes the groundwater flow.

Recharge to the basalt aquifer was considered by the EIS as being likely to occur in areas of thin soil cover or where the basalt outcrops, for example along ridgelines, where groundwater can move downwards into the aquifer via fractures, joints and vesicles. However, the high clay content of the heavy black soils that cover much of the proposed Rolleston West mining area (MLA70415 and the western part of ML70307) was considered likely to accentuate evaporation of rainfall and constrain recharge to the basalt aquifers.

A substantial zone of Quaternary alluvium occurs along Meteor Creek, Sandy Creek and, to a lesser extent, Bootes Creek and Spring Creek. The alluvium along Meteor Creek and Sandy Creek was reported to be up to 30m thick, with low permeability clayey sediments up to 20m thick overlying basal gravelly sands. According to the EIS, groundwater recharge to the basal gravelly sands occurs mainly from Meteor Creek during high flow events, while the alluvium receives little direct recharge from rainfall, as the upper clayey sediments limit infiltration. Although the gravel is highly permeable and supports irrigation bores in localised areas, the sediments occurring over most of the project area were reported to be clayey or cemented with low groundwater yield and capable of supporting stock and domestic uses.

#### 4.13.2 Impacts on groundwater flows and quality

The EIS applied the numerical groundwater model MODFLOW SURFACT over an area of 35.2km by 52.4km to assess spatial patterns over time of project impacts on aquifer levels, bores and creek flows, and to simulate seepage into the open-cut pits. The model was calibrated using available data from bores and RCM pit dewatering. It was described in the EIS as being 'fit-for purpose to simulate impacts including dewatering requirements'.

The model was constructed using 10 layers to represent different hydrogeological units, some of which are useable aquifers. Layers 1 and 2 comprised topsoil, regolith and Quaternary alluvium, layers 3 and 4 comprised massive and fractured basalt respectively, and layers 5 to 10 corresponded to different Permian strata. The top four layers were found to have similar depressurisation responses. However, the aquifer in the fractured basalt is overlain by both low permeability massive basalt and low permeability, highly weathered basalt.

The EIS stated that a peer review of the groundwater model had been conducted by the consultancy group Parsons Brinckerhoff, who found the model to be generally compliant with the Australian Groundwater Modelling Guidelines issued by the National Water Commission. The peer review, which was provided to EHP and DNRM as additional information, stated:

*'the sensitivity and uncertainty analysis is thorough and indicates that +/-50% uncertainty in even the most sensitive parameters has a low to moderate influence on the predicted impacts and fluxes. No significant change to the model is recommended.'*

The model was used to assess the combined effects of the operating RCM and the project. It predicted relatively high rates of seepage from the Quaternary alluvium into the proposed Meteor South A and B and Meteor West pits. Lower rates of seepage into the Rolleston West pits were predicted during the early years of mining but seepage was expected to increase as thicker saturated Tertiary basalts are intersected. The EIS groundwater model predicted that inflow to the mine pits would increase up to a maximum of:

- 8.2 ML/day (2993ML/year) in 2021 for the Quaternary alluvium
- 0.6 ML/day (220ML/year) in 2035 for the Tertiary basalt
- 2.6 ML/day (950ML/year) in 2035 for the Permian coal measures.

According to the EIS, the rate of groundwater extraction during mining would exceed the rate of aquifer recharge. As a result, mining would lead to depressurisation and a drawdown in groundwater levels. According to the EIS, permanent groundwater depressurisation of the fractured basalt aquifer is likely to extend over an area of approximately 43,000ha, including significant areas (over 3000ha) of Albinia National Park. Within the basalt aquifer, the model indicated reductions in groundwater potentiometric surfaces of in the order of 1 to 5 metres outside the mining lease, and greater levels within the mining lease.

The drawdown in the Meteor Creek alluvium was predicted to extend 4km upstream and 5km downstream of the Meteor South A and Meteor South B Pits. Baseflow from groundwater into the reach of Meteor Creek adjoining the pits was therefore expected to be eliminated. The affected section would extend from an upstream Permian sandstone bar to a basalt ridge downstream within Albinia National Park. Moreover, though Meteor Creek would no longer gain water from surrounding aquifers in this reach, it was predicted to lose water to surrounding aquifers during high flow events. However, impacts on baseflows in Meteor Creek downstream of Bootes Creek were not expected to be as significant because of the diffuse contribution from rainfall in recharging the alluvial aquifer in this section.

The EIS stated that the predicted zone of groundwater depressurisation would be largely contained within properties now owned by XCQ, although it was also predicted to extend about 2.5km into Bottle Tree Station and about 2km into Albinia National Park at the end of mining (nominally in 2035) and permanently for more than 6km on equilibrium.

The effects of depressurisation in the basalt and alluvial aquifers would be distinct because of the minimal hydrological connection between them. Because of the confined nature of the basalt aquifer, its depressurisation would only directly affect groundwater bores tapping into it. In contrast, depressurisation within the shallow, unconfined alluvial aquifer along Meteor Creek would be directly expressed as drawdown in the groundwater table. This response has important implications for potential impacts on GDEs.

Following mining, a reduced aquifer drawdown, extending 2.5km upstream and 2.5km downstream in the Meteor Creek alluvium, was predicted as saturation levels recovered. The section of the alluvium adjacent to the mining area was predicted to remain permanently dewatered, since the Meteor South void would act as a groundwater sink with water flowing from the alluvial aquifer towards the void.

Other final mining voids were also predicted to act as groundwater sinks (as illustrated in Figure 88, EIS Appendix H-1). The voids would collect and accumulate water due to seepage from surrounding coal seams, basalt, alluvium and backfilled spoil, as well as rainfall and runoff into the void. The W3 pit in the Rolleston West area was expected to dominate the local groundwater flow after the end of mining, as the void would contain the lowest water level during the period of groundwater recovery when dewatering ceased. Because the predicted hydraulic gradients would be towards the voids, preventing water movement from the voids into surrounding aquifers, the EIS stated that the water quality of groundwater was unlikely to be adversely affected by changes in water quality in the pits over time and would therefore remain suitable for consumption by cattle. The IESC was concerned that increased catchment inflows (e.g. due to climate change) to the voids could result in a discharge from the pits into the aquifers in the long-term.

Over the longer-term, the zone of depressurisation was predicted to extend further laterally in most directions (up to 7km to the north, 5km to the east and 4km to the west) as the regional hydraulic gradient reached a flatter, post-mining equilibrium. This quasi-equilibrium would be reached when evaporation from the final voids generally exceeded groundwater seepage. Salt balances in final voids were modelled over a 200 year period, with the EIS concluding that water quality would remain suitable for beef cattle.

Modelling of the spatial extent of groundwater depressurisation in the amended EIS showed that, within the period of project mining, depressurisation outside the lease area towards the north and east would be largely attributable to the approved RCM mining, with the exception of the area in the vicinity of Meteor Creek and to the south-east. However, once the post-mining equilibrium condition is reached, the predicted zone of depressurisation outside the different lease areas would be largely attributable to the project (as illustrated by Figures 10.23 and 10.27, EIS Chapter 10).

The EIS highlighted several sources of uncertainty in the groundwater modelling. In particular, modelled predictions of depressurisation depended strongly on the setting of values for key parameters. Sensitivity analyses were undertaken for the EIS by Australasian Groundwater and Environmental Consultants Pty Ltd. These analyses involved comparative modelling runs over the mining period in which the recharge rate, hydraulic conductivity and storage properties of the upper 3 of the 10 hydrogeological layers used in the model, as well as the backfilled spoil, were varied by +50% relative to the calibrated rates. The results were found to be not strongly sensitive to changing the individual modelling parameters, the most sensitive response being a 1km lateral shift in the drawdown of the Meteor Creek alluvium as a result of a +50% change in the hydraulic conductivity of the alluvial aquifer.

The assessment of project impacts on groundwater and surface water in the EIS released for public submissions was reviewed by the IESC at the request of EHP and DOE. In response to the IESC advice, XCQ justified the use of low recharge rates for the alluvium layer in the model as providing a conservative basis for predicting dewatering and depressurisation.

Some uncertainties are associated with the reality of variable aquifer conditions, which would mostly tend to result in lower rates of seepage and drawdown than model predictions based on an assumption of uniform, 'average' hydraulic properties within the model layers. For example, groundwater seepage to the mine may be constrained where aquifers within the tertiary basalt are compartmentalised. Similarly, assumptions of average hydraulic conditions may differ from the reality of both early rapid seepage from alluvial and basalt aquifers as well as recharge to these aquifers being dominated by rainfall events leading to high creek flows and flooding. Significant recharge to alluvium was considered only likely to occur during high stream flow events when there would be sufficient head gradient to promote seepage into the alluvium.

The IESC advice generally accepted the validity of the conceptual model and the numerical groundwater model in the EIS and included the following summary comment:

*'The proponent has provided a conceptual model for the region, based on a fundamental understanding of the local and regional geology. However, uncertainties remain in relation to the extent of alluvium along Bootes Creek and the potential for groundwater interaction with surface water features, in particular, the wetlands located within the extent of predicted drawdown. Model construction and domain appear adequate. With the exception of parameterisation for the alluvium within the numerical groundwater model, parameters in general appear reasonable and representative of aquifer conditions.'*

XCQ provided reasonable and adequate responses to the IESC's concerns relating to spatial information on alluvium and parameterisation of alluvium in the model.

The IESC also identified two main uncertainties in the interaction of surface waters and groundwater:

- the consequences of above-average rainfall and recharge for groundwater fluxes and quality in the Meteor South Pit void
- the potential for associated ecological impacts.

In its submission on the EIS, DNRM raised a range of technical concerns in relation to the groundwater modelling and assessment. One of these concerns aligned with those of the IESC in that DNRM considered that the modelling approach could underestimate groundwater inflows to the mine pits after large flow events in Meteor Creek. DNRM's concerns were adequately addressed by XCQ in its response and amended EIS. While XCQ considered the model to be robust in terms of calibration, DNRM noted the opportunity to refine the calibration of recharge into the basalt aquifer from observations during mine operations.

### **4.13.3 Impacts on groundwater dependent ecosystems**

Drawdown of groundwater may impact on ecosystems where the water table is sufficiently shallow for the ecosystems to be dependent on groundwater. A number of EIS submissions raised concerns that mine dewatering for the project would remove in the order of 25,000ML of groundwater over the estimated 21 year life of the mine and hence pose a threat to wetlands. XCQ responded that this dewatering estimate was conservatively high while the estimated recharge to the system of 148,700ML was conservatively low, and furthermore that the wetlands are not vulnerable to aquifer drawdown.

According to the EIS, groundwater depressurisation at the end of mining was predicted to only extend beneath one HES wetland, which is located on Meteor Park Station. However, this wetland is sited within the existing mining lease and is also expected to be impacted by mining, through catchment loss.

The EIS contended that other off-stream wetlands would not be affected by aquifer depressurisation arising from the project (in combination with the RCM), since available evidence suggested that there would be minimal interaction between these water bodies and the basalt aquifer due to the presence of an aquaclude layer between them. This conclusion is supported in part by the predominantly ephemeral character of the wetlands, which appear to rely on surface flows. The HES wetland within Albinia National Park has been identified in EHP mapping as being fed by floodplain flows and it is considered in the EIS to be unlikely to have a significant connection with the deep basalt aquifer. Inference of a minimal connection between groundwater and wetlands was also supported by EIS analysis of isotope patterns, water quality (conductivity) and head elevations.

However, in its review of the exhibited EIS, the IESC expressed strong concerns about the adequacy of the EIS assessment of impacts on wetlands, GDEs and riparian vegetation, including threatened species and ecological communities, as a result of both groundwater drawdown and changed stream conditions. The IESC considered that dewatering during the operational phase of the mine could lead to long-term impacts on GDEs and wetlands (as well as on the hydrology of Meteor Creek and groundwater quality). Moreover, in the view of the IESC, comprehensive identification and conceptualisation of hydro-dependencies of GDEs within the area of groundwater drawdown would be needed to enable a full evaluation of potential impacts and risks to natural ecosystems.

In response to submissions and the IESC, XCQ provided further details of terrestrial GDEs, aquatic ecology and stygofauna that could be affected by the project (as discussed in section 4.14 of this EIS assessment report). The amended EIS identified the pre-mining depth of the water table as an indicator of the likelihood of GDEs occurring, and hence the potential for impacts from drawdown associated with the project. Drawing on criteria provided by DSITIA, the EIS assumed that, if water levels in suitable geologies are more than 20m below ground level, GDEs are unlikely, whereas GDEs are likely to occur where the water table is less than 10m deep. On this basis, the EIS identified a total of 144ha of ecosystems – including 121ha on alluvium and 23ha over basalt - outside the project footprint that are likely to be terrestrial GDEs and that may be affected by aquifer drawdown.

Notwithstanding the potential exposure of GDEs to aquifer drawdown, the EIS suggested that significant indirect effects on GDEs would be unlikely because of the relatively small area affected, the conservative prediction of depressurisation, the gradual nature of the dewatering, the contribution of supplementary water sources such as rainfall and lenses of perched water, and the resilience of affected species.

Subsequent to the publically displayed EIS, XCQ has provided EHP with additional historic information from nine government bores in Albinia National Park that identifies both the depth of intersection of groundwater and the standing water level once the basalt aquifer was penetrated. These data indicate that the depth to the basalt aquifer is in the range of 20 to 70 metres below ground level. Consequently, the assumption in the EIS documentation is that the basalt aquifer is well below the potential rooting depth of plants that comprise part of a GDE.

Queensland Herbarium's mapping of regional ecosystems outside the mining lease area – and on which the EIS has relied – indicates that ecosystems within Albinia National Park that might be GDEs are located on the alluvium rather than on the basalt. Based on those maps, the additional information provided by XCQ identifies an area of 2.5ha of possible terrestrial GDE within Albinia National Park on alluvium. The significance of this information is that it provides a plausible estimate of the area of GDE within the park that may be at risk from drawdown in the alluvial aquifer due to the project. Confirmation of the potentially affected area would be appropriate on the basis of refined mapping of GDEs (as discussed further in section 4.14 of this EIS assessment report).

Queensland Parks and Wildlife Service (QPWS) had advised EHP of its concerns for possible impacts of the project on Albinia National Park. In response to the exhibited EIS, QPWS stated the potential for impacts from project groundwater depressurisation on adjacent national parks, conservation parks and state forest had not been adequately addressed. However, following review of the amended EIS and discussions with XCQ, QPWS has accepted the revised impact statement and sought confirmation that there would be minimal impacts to the environmental values within Albinia National Park and that the proponent be required to implement appropriate systems to ensure the groundwater depressurisation impacts are monitored, prevented and rectified where required.

#### **4.13.4 Impacts on other water users**

The project area is covered by the Fitzroy Basin Water Resource Plan, which provides a framework for water allocations and the regulation of taking of surface and ground water. The project is within the Highlands Groundwater Management Area and would require a water licence under the Water Act to take or interfere with groundwater. In addition to water entitlements for maximum expected inflows to the mine pits, a water entitlement may be required to cover the loss of baseflow to Meteor Creek.

Submissions from Lock the Gate Alliance and others expressed concern about the impact of the drawdown on the alluvial aquifers and beneath good quality agricultural land. These concerns have been responded to by XCQ in terms of both the likely impacts of this drawdown on users and proposed mitigation responses.

While depressurization would reduce the availability of groundwater for use by landholders, most adjoining properties are owned by XCQ. According to the EIS, 19 bores are located on adjoining properties that are not owned by XCQ, i.e. 'Bottle Tree Downs' and the Albinia National Park, but only three of these bores were predicted to be impacted by groundwater depressurisation during mining. However, 15 bores on properties not owned by XCQ were identified as potentially being affected by drawdown over the longer term. Submissions from the operators of 'Bottle Tree Downs' and from QPWS noted the need for effective monitoring of groundwater to inform responses to impacts. XCQ proposed to negotiate make good agreements with these parties. Suitable mitigation strategies were expected to be available to address the landholders' needs.

U&D Mining raised concerns including groundwater impacts to its proposed Meteor Downs South (MDS) coal mine. The EIS has addressed both the potential extent of groundwater depressurisation due to the project within the MDS project area and the cumulative impacts of the RCM, the project and MDS.

#### **4.13.5 Impact monitoring and management**

XCQ stated that ecological risks from aquifer depressurisation are not high and committed to introducing monitoring of groundwater and ecosystems during project implementation in order to identify any impacts and address relevant risks. However, related commitments were not well defined.

XCQ proposed that the EA for the RCM could be amended to encompass the project, including monitoring and management requirements for groundwater.

According to the EIS, the current RCM monitoring network would be suitable for short- to medium-term monitoring of depressurisation of surrounding aquifers to determine the zone of influence of the project and RCM mining activities. Staged installation of additional monitoring bores in upstream and downstream sections of Meteor Creek as well as in the regional basalt aquifers within the project area was proposed to enhance monitoring of long-term impacts arising from the project and RCM.

XCQ proposed quarterly monitoring of groundwater levels and quality surrounding the project, based on an extension of the current RCM program, in order to measure any local or regional changes due to the project in combination with the RCM. Automated logging of groundwater levels in monitoring bores was proposed for both the Meteor Creek and Sandy Creek alluvium as well as the regional basalt aquifer. XCQ further proposed that the EA should require submission of a report after 12 months of operation setting out a groundwater monitoring program, including proposed investigation trigger limits and a review of data on groundwater level and quality, to enable EHP to develop suitable groundwater monitoring conditions. No commitments to management action were proposed, other than 'make-good' agreements for any impacts on bores.

Both the IESC and DNRM have suggested that the monitoring network proposed by XCQ does not sufficiently cover the predicted zone of depressurisation, particularly in the alluvium.

A robust program for monitoring of depressurisation in the alluvial aquifer would be needed in combination with suitable triggers for mitigation action to confirm that no significant impacts to GDEs did occur outside the project area, especially within Albinia National Park.

### **4.13.6 Adequacy of the EIS and outstanding matters**

While the EIS provided an adequate overall response to the TOR, especially in terms of the modelling undertaken, there was an initially limited assessment of ecological values that are vulnerable to groundwater changes, possible impact pathways and potentially suitable responses.

In light of the additional information provided by XCQ during the later stages of the EIS process, conclusions in the EIS of potential impact from groundwater changes that remain founded on the assumption of total confinement of the basalt aquifer are considered acceptable. However, noting the degree of uncertainty in that assumption and the modelling provided, and the significant value of some of the GDE and aquatic ecosystem values in the depressurisation zone, it is important to note that decisions about suitability of the project are established on the statements in the EIS that it is unlikely that there will be impacts to those values. Consequently should the project proceed, it is important that commitments to not impact those values, for example in Albinia National Park, are established in conditions of approval. Confirmation of that outcome should be provided through design and implementing of relevant monitoring programs.

### **4.13.7 Conclusions and recommendations**

Several submissions were received on the EIS relating to potential hydrological and related environmental impacts of the modelled groundwater changes. Those concerns were highlighted by submissions from the IESC and NPRSR.

While some changes were made to the final EIS documentation in response to submissions received on the EIS, these were not sufficient to adequately address all concerns raised. In particular, the EIS did not initially adequately assess potential indirect impacts of groundwater drawdown on terrestrial GDEs outside the project area. This has potential implications for MNES and MSES and protected area estate. However, additional information recently provided to EHP by XCQ has clarified the risk or scale of potential impacts.

In order to protect the environmental values of Albinia National Park, it would be necessary to establish an effective program for monitoring groundwater drawdown in the alluvial aquifer in the vicinity of the park, in combination with appropriate investigation and mitigation triggers. A limited program should also be required to confirm that the wetland within Albinia National Park is not affected by the interaction of surface waters with the basalt aquifer.

It is recommended that the program and triggers be agreed by EHP, QPWS, DNRM and DOE, and then incorporated into the EA conditions for the project within the framework of the required EMP. These measures would need to be complemented by a suitable baseline assessment and monitoring program for the potentially affected GDEs including riparian GDEs along the sections of Meteor and Bootes creeks within Albinia National Park, as discussed further in section 4.14 of this EIS assessment report.

## **4.14 Ecology**

### **4.14.1 Biodiversity values**

#### **4.14.1.1 Overview**

Ecology was discussed in the EIS Chapter 13, Terrestrial flora and Chapter 14, Terrestrial fauna with detailed information on the terrestrial ecology assessment provided in Appendices K-1, K-2, K-3, K-4 and L-1, and in the Offset Strategy, Volume 3. Matters of national environmental significance under the EPBC Act (MNES) were addressed in Chapter 21 and Appendices Q-1 and Q-2. MNES are further discussed in section 5 and Appendix B of this EIS assessment report.

The EIS described the desktop terrestrial flora and fauna studies that were undertaken, prior to field surveys, to identify the potential ecological values present within the project area, particularly values that are provided greater protection under State and Commonwealth legislation. The flora and fauna values of the project site, and the likely direct and indirect impacts on those values arising from the construction, operation and decommissioning of the project were described and discussed. The EIS stated how the potential environmental impacts would be managed and mitigated, and estimated the magnitude and significance of residual impacts. Offset requirements for both State significant biodiversity values (SSBVs) and MNES were determined where the project was expected to have a significant residual impact on those values.

Aquatic Ecology was addressed in the EIS Chapter 15, Aquatic Ecology with a detailed assessment provided in Appendix M-1. The EIS discussed semi-aquatic mammals, amphibians, reptiles, avifauna, wetland birds and riparian vegetation in Chapter 13, Terrestrial Flora, Chapter 14, Terrestrial Fauna and Chapter 21, Matters of National Environmental Significance.

The aquatic ecology, including habitat, flora, fauna and stygofauna relevant to the project site, and the likely direct and indirect impacts on those values arising from the construction and operation of the project were described and discussed in the EIS. XCQ stated how the potential environmental impacts would be mitigated, and evaluated the significance of residual impacts via a risk assessment table. The EIS concluded that no significant impacts to aquatic ecology were likely.

The project area is located 16km west of Rolleston, approximately 275km west of Gladstone and 120km south-east of Emerald. The project area is located on the southern boundary of the Basalt Downs subregion, partly within the Arcadia subregion, at the interface between the northern and southern Brigalow Belt bioregions. There has been a rapid and extensive loss of habitat within the Brigalow Belt bioregions that has resulted in significant declines in remnant vegetation and species populations. Major ongoing threats to these bioregions include vegetation clearing, high grazing pressure, and the proliferation of exotic species. The project area is bordered on three sides by protected estate and State forest; Albinia National Park to the east, Mount Pleasant State Forest to the south, and Mount Hope State Forest to the west.

#### 4.14.1.2 Flora values

Flora surveys were conducted to verify desktop results and included targeted searches for threatened flora species and weed infestations. Surveys were also conducted to determine the location, extent and condition of native vegetation across the project area having regard to the relevant regional ecosystem descriptions and EPBC Act threatened ecological community criteria.

Flora surveys were conducted in three survey periods:

- (i) baseline–pre-wet season (7–11 November 2011) and post-wet season (16–18 March 2012; 11–13 April 2012 and 17 April 2012)
- (ii) pre-wet season (4–11 November 2012) and post-wet season (13–16 March 2013)
- (iii) winter surveys of Sandy Creek and Meteor Creek (1–2 July 2012) and other areas (3–30 July 2013).

The EIS identified 19 regional ecosystems and high value regrowth regional ecosystems within the project area following vegetation and flora surveys (refer to Table 4 of this assessment report). Four regional ecosystems are listed as endangered, eight as of concern and eight as least concern under the *Vegetation Management Act 1999* (VM Act). The project area contains an estimated 7419ha of remnant vegetation, 118ha of high value regrowth vegetation, 36ha of dams and 5185ha of non-remnant vegetation.

**Table 4 Verified regional ecosystems and their extent within the project area (Source: EIS Chapter 13, Terrestrial Flora, Tables 13–5, 13–6 and 13–4)**

Regional ecosystem	Description	VM Act class <sup>1</sup>	Biodiversity status <sup>2</sup>	Corresponding TEC <sup>3</sup>	Total area on project site (ha)	Area to be cleared (ha)
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of concern	Of concern		96	49
11.3.21	<i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp. grassland on alluvial plains	Endangered	Endangered	Natural grasslands	80	73
11.3.3	<i>Eucalyptus coolabah</i> woodland on alluvial plains	Of concern	Of concern		137	23
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. woodland on alluvial plains	Of concern	Of concern	-	34	2
11.3.6	<i>Eucalyptus melanophloia</i> woodland on alluvial plains	Least concern	Of concern		423	246
11.3.21	<i>Dichanthium sericeum</i> and/or <i>Astrebla</i> spp. grassland on alluvial plains. Cracking clay soils	Endangered	Endangered	Natural grasslands	48.7	24.9
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least concern	Of concern		432	158

Regional ecosystem	Description	VM Act class <sup>1</sup>	Biodiversity status <sup>2</sup>	Corresponding TEC <sup>3</sup>	Total area on project site (ha)	Area to be cleared (ha)
11.3.27	Freshwater wetlands	Least concern	Of concern		79	23
11.4.4	<i>Dichanthium spp.</i> , <i>Astrebla spp.</i> grassland on Cainozoic clay plains	Least concern	No concern at present	Natural grasslands	51	51
11.4.8	<i>Eucalyptus cambageana</i> woodland to open-forest with <i>Acacia harpophylla</i> or <i>A. argyrodendron</i> on Cainozoic clay plains	Endangered	Endangered	Brigalow	2	1
11.4.9	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	Endangered	Brigalow	35	27
11.8.11	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks	Of concern	Of concern	Natural grassland	1,621	988
11.8.11a	<i>Melaleuca bracteata</i> woodland drainage depressions	Of concern	Of concern		376	250
11.9.2	<i>Eucalyptus melanophloia</i> +- <i>E. orgadophila</i> woodland on fine-grained sedimentary rocks	Least concern	Least concern		82	15
11.9.4	Semi-evergreen vine thicket or <i>Acacia harpophylla</i> with a semi-evergreen vine thicket understorey on fine-grained sedimentary rocks	Endangered	Endangered	Semi-evergreen vine thickets	1	1
11.8.5	<i>Eucalyptus orgadophila</i> woodland on Cainozoic igneous rocks	Least concern	Least concern		3,796	2,339
11.8.5a	<i>Eucalyptus orgadophila</i> woodland within a dense understorey	Least concern	Least concern		70	10
11.8.15	<i>Eucalyptus brownii</i> or <i>Eucalyptus populnea</i> woodland on Cainozoic igneous rocks	Endangered	Endangered		13	10
11.8.6	<i>Macropteranthes leichhardtii</i> thicket on Cainozoic igneous rocks	Least concern	Least concern	Semi-evergreen vine thickets	90	14
HVR 11.4.9	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains			Brigalow	15	14
HVR 11.8.6	<i>Macropteranthes leichhardtii</i> thicket on Cainozoic igneous rocks			Semi-evergreen vine thickets	103	37

<sup>1</sup>VM Act class - Conservation status under the VM Act

<sup>2</sup>Biodiversity status - Conservation status under the EP Act

<sup>3</sup>TEC – Threatened ecological community under the EPBC Act

<sup>4</sup>HVR – High value regrowth



Based on their component regional ecosystems, four EPBC Act listed threatened ecological communities (TECs) were identified within the project area:

- brigalow (*Acacia harpophylla* dominant and co-dominant) (brigalow TEC)
- natural grasslands of the Queensland Central Highlands and Northern Fitzroy Basin (natural grasslands TEC)
- semi-evergreen vine thickets of the Brigalow Belt and Nandewar bioregions (semi-evergreen vine thicket TEC)
- coolibah-black box woodlands of the Darling Riverine Plains and Brigalow Belt south bioregions (coolibah-black box woodlands TEC).

A total of 270 flora species from 169 genera and 61 families were recorded from the project area. The only flora species listed as threatened under the NC Act found to occur in the project area was *Cyperus clarus* (vulnerable).

The EIS provided an estimate of the likelihood of listed threatened flora species (under EPBC Act and NC Act) to occur within the project area based on habitat availability and condition:

- Species considered likely to occur:
  - *Trioncinia retroflexa* (endangered under NC Act)
  - *Aristida annua* (vulnerable under both EPBC Act and NC Act)
  - *Dichanthium queenslandicum* (vulnerable under NC Act and endangered under EPBC Act)
  - *Dichanthium setosum* (vulnerable under EPBC Act)
  - *Commersonia argentea* (vulnerable under EPBC Act)
- Species considered possible to occur:
  - *Marsdenia brevifolia* (vulnerable under both EPBC and NC Acts)
  - *Cadellia pentastylis* (vulnerable under EPPC Act).

During the flora surveys 36 species of introduced flora were recorded within the project area, three of which are declared Class 2 pests under the *Land Protection (Pest and Stock Route Management) Act 2002* (LP Act) and listed weeds of national significance. These species were:

- *Opuntia stricta*
- *Opuntia tomentosum*
- *Parthenium hysterophorus*.

Mapping reported in the EIS indicated that there was potentially 311ha of groundwater dependent ecosystems (GDEs) within the alluvium and 448ha of GDEs over basalt within the project area and the surrounding area of predicted groundwater depressurisation.

#### **4.14.1.3 Fauna values**

Fauna surveys included two pre-wet season surveys conducted between 19 and 25 November 2011, with supplementary bird surveys and spotlighting conducted between 16 and 18 March 2012 and between 5 and 11 December 2012, and a dry season survey between 27 and 31 July 2012. Additional habitat assessments were undertaken in July 2013.

The EIS provided an estimate of the likelihood of listed threatened species (under EPBC and NC Act) to occur within the project area based on habitat suitability and condition:

- species confirmed to occur
  - black-necked stork (near threatened under NC Act)
  - squatter pigeon (southern) (vulnerable under EPBC and NC Acts)
  - black-chinned honeyeater (near threatened under NC Act)
  - cotton pygmy-goose (near threatened under NC Act)
  - Australian painted snipe (endangered under EPBC Act and vulnerable under NC Act)
  - black-breasted button quail (vulnerable under EPBC Act and NC Act)
  - little pied bat (near threatened under NC Act)

- species considered likely to occur
  - rough-collared frog (near threatened under NC Act)
  - common death adder (near threatened under NC Act)
  - ornamental snake (vulnerable under EPBC Act and NC Act)
  - brigalow scaly-foot (vulnerable under NC Act)
- species considered possible to occur
  - collared delma (vulnerable under EPBC Act and NC Act)
  - yakka skink (vulnerable under EPBC Act and NC Act)
  - Dunmall's snake (vulnerable under EPBC Act and NC Act)
  - grey snake (endangered under NC Act)
  - golden-tailed gecko (near threatened under NC Act)
  - red goshawk (vulnerable under EPBC Act and NC Act)
  - grey falcon (near threatened under NC Act)
  - painted honeyeater (vulnerable under NC Act)
  - square-tailed kite (near threatened under NC Act)
  - powerful owl (vulnerable under NC Act)
  - black-throated finch (endangered under EPBC Act and NC Act)
  - northern quoll (endangered under EPBC Act)
  - spotted-tail quoll (endangered under EPBC Act and vulnerable under NC Act)
  - ghost bat (vulnerable under NC Act)
  - south-eastern long-eared bat (vulnerable under EPBC Act and NC Act)
  - koala (vulnerable under EPBC Act and special least concern under NC Act).

During survey work 10 pest fauna species were confirmed to be present within the project area and five were considered as possible to occur, including:

- pest species confirmed to occur:
  - dog (Class 2 LP Act)
  - dingo (EPBC Act invasive species and Class 2 LP Act)
  - feral cat (EPBC Act invasive species and Class 2 LP Act)
  - Asian house gecko
  - brown hare
  - house mouse
  - European rabbit (EPBC Act invasive species and Class 2 LP Act)
  - black rat
  - cane toad (EPBC Act invasive species)
  - feral pig (EPBC Act invasive species and Class 2 LP Act)
- pest species considered possible to occur:
  - rock dove
  - house sparrow
  - spotted turtle dove
  - common starling
  - red fox (EPBC Act invasive species and Class 2 LP Act).

#### **4.14.1.4 Aquatic ecology values**

The project lies within the Comet River catchment of the Fitzroy Basin. The Comet River catchment covers 6474km<sup>2</sup> and has 2001km of waterways. According to the EIS no wetlands of international or national significance are located within the project site, however the catchment is connected to the Great Barrier Reef (GBR) World Heritage Area located approximately 690km downstream of the project site.

The EIS identified the regional context of the project as being subject to a Fitzroy Basin creek flow regime dominated by highly variable, intermittent summer flows. This leads to most stream reaches tending to be dry during winter and the magnitude, duration and timing of summer flows varying greatly between years. Therefore much of the aquatic flora and fauna in the system are typically resilient to seasonal changes and variability in water availability. Permanent riverine pools and wetlands provide critical habitat and refuge for aquatic species to persist during dry periods.

Aquatic habitat, flora and fauna within and adjacent to the project area was assessed in the late wet season and the dry season and included assessment of Bootes, Sandy and Meteor creeks as well as tributaries and wetlands upstream of, within and downstream of the project site (to approximately 5km downstream). For the purposes of this section of this assessment report, this will be referred to as the study area. Three broad types of wetlands were identified as occurring within the study site: riverine, palustrine and lacustrine wetlands. Riverine and palustrine wetlands occur within the adjacent Albinia National Park.

The major waterways within the study area include Bootes and Meteor Creeks. Bootes Creek and two of its tributaries, Spring Creek and Gibbs Gully, lie within ML70307. Meteor Creek and Sandy Creek (which subsequently joins Meteor Creek) lie within MLA70458 and MLA70416. Bootes Creek joins Meteor Creek just downstream of ML70307. Meteor Creek then flows through Albinia National Park into the Comet River, approximately 22km downstream of the project site. The project would require the diversion of Sandy Creek (catchment area: 10,990ha) into Meteor Creek (catchment area: 64,830ha) on MLA70458.

The surface water survey sites were identified in the EIS as being in poor to moderate condition. This was attributed to low habitat variability, limited stream velocity and depth with substrates dominated by sand and silt. Little change in habitat condition was observed between sampling periods. Land adjacent to the riparian zone has been impacted by grazing, mining and roads. Riparian zones are dominated by non-native grasses and exotic species of plants such as *Parthenium hysterophorus*. Evidence of bank erosion was present at most sites surveyed. Channel diversity was low and dominated by pools and runs.

The riverine systems were described as ephemeral channels, being slow-flowing in the late wet season and dominated by isolated pools; or dry in the dry season. The exception was some reaches of Meteor Creek, which may have low flow in the dry season. The palustrine wetlands were identified on dammed minor watercourses (i.e. they were not there prior to European settlement). They provide more permanent (perennial) aquatic habitat, with in-stream habitat provided by dead trees that had been inundated as well as aquatic vegetation, although they were not dominated by persistent emergent vegetation. As such, they are probably better classified as lacustrine wetlands. The lacustrine wetlands were located on dammed minor watercourses (i.e. they were not there prior to human disturbance). They provide permanent (perennial) aquatic habitat, although they typically had a lower in-stream habitat diversity and cover than the mapped palustrine wetlands that were surveyed.

Referable wetlands are mapped at the State level and given effect through schedule 12 of the EP Reg. High Ecological Significance (HES) wetlands and General Ecological Significance (GES) wetlands are mapped on the project site and in the adjacent Albinia National Park. Riverine and non-riverine wetlands for the region have also been assessed by EHP's Aquatic Conservation Assessment (ACA) for the GBR Catchment. All of the non-riverine wetlands, including wetlands on Sandy Creek and Bootes Creek, identified in the study area are associated with 'high' AquaScores. Riverine wetlands had an AquaScore of 'medium' likely due to the presence of remnant and non-remnant vegetation and due to grazing activities affecting the condition of understorey vegetation.

A combination of desktop research, targeted field investigations and stygofauna pilot studies were completed in the project site. Three surface water surveys were undertaken across 19 sites in April and July of 2010 and April 2012. An additional late wet survey undertaken in 2012 followed a wetter than usual wet season.

A total of 25 species of aquatic flora (macrophytes) were recorded which is a relatively high number of species compared with historical studies undertaken on the Comet River catchment. Macrophyte richness and cover was generally higher at the wetland sites than the riverine sites, with the highest richness and cover recorded at site W2 (Davey Dam) in April 2012. No exotic or listed endangered, vulnerable, near threatened or priority aquatic flora species were recorded in the project site.

According to the EIS there are no known listed rare, threatened, exotic or priority macroinvertebrate species in the Fitzroy Basin or Comet River catchment. Taxonomic richness was below the water quality objective (WQO) range for the Comet Sub-basin at most sites in all surveys. The exceptions were sites on Meteor Creek that had high substrate or habitat diversity and at one of the wetland sites (i.e. site W4 upstream of the Sandy Creek diversion).

The EIS concluded that macroinvertebrate communities of the project site are indicative of poor to moderate habitat and water quality, which reflects the ephemeral nature of waterways of the area and the impacts from surrounding land uses. Macroinvertebrate communities in the larger waterways of the project site and the Brown and Comet rivers are considered in the EIS to be indicative of moderate to good water and habitat quality. No priority species were identified during the surveys but five common macrocrustacean species were identified being freshwater shrimps, river prawns, yabby, red claw and freshwater crab.

There are no mapped or recognised fish habitats within the study area. No endangered, vulnerable or rare species listed under the EPBC Act or Nature Conservation (Wildlife) Regulation 2006 (NCW Reg) are known from the Fitzroy Basin or the Comet River catchment. Of the 13 species known to occur in the Fitzroy Basin, eight species were recorded in the study area. The highest fish abundance was in Bootes Creek downstream of the project site (site J) within the Albinia National Park.

The Fitzroy Basin has high conservation value with respect to freshwater turtles, as there are many species endemic to the region. Six turtle species have been recorded from the Fitzroy Basin riverine wetland areas. However, no exotic or listed endangered, vulnerable, near threatened or priority turtle species were recorded during field surveys. The only species of turtle recorded within the project site was the Krefft's river turtle, *Emydura krefftii* (listed as least concern under the NCW Reg) at site W2 (within part of ML70307) and at site W4 (upstream of the proposed creek diversion).

According to the EIS, two sampling events for stygofauna at groundwater bores were undertaken in 2011 and 2014. Groundwater bores were located within and outside the area of potential groundwater depressurisation. Analysis of the 2014 field samples identified obligate groundwater dependent fauna (i.e. stygofauna) in four of the 18 bores sampled (22%), three of which were in the mine expansion area. Five families were identified across bores indicating connectivity between aquifers and populations. The survey conducted in 2011 (ALS, 2012) recorded the presence of obligate groundwater dependent fauna in six of 12 bores sampled (50%). Stygofauna were identified to family level, none are specifically prescribed by State or Commonwealth legislation.

## **4.14.2 Impacts**

### **4.14.2.1 Terrestrial flora and fauna**

The EIS identified the main impacts associated with the construction phase of the project as:

- removal of native vegetation
- habitat loss
- habitat fragmentation and loss of habitat connection
- habitat degradation
- fauna mortality and morbidity
- fauna disturbance
- removal of individual flora species
- fragmentation of vegetation and landscape connectivity
- erosion and sedimentation
- edge effects
- spread of introduced plant species.

The main impacts associated with the operational phase of the project were identified as:

- removal of native vegetation and threatened flora
- fauna mortality and morbidity
- habitat degradation
- erosion and sedimentation
- dust generation
- groundwater depressurisation
- spread of introduced plant species
- edge effects.

The EIS stated that significant impacts on flora and fauna values were not anticipated from the decommissioning phase of the project.

### **4.14.2.2 Connectivity**

The EIS acknowledged that the project would cause partial fragmentation of an area of vegetation between Albinia National Park and Mount Hope State Forest. However, the EIS stated that vegetation outside the project site would continue to provide connection between the two areas. EHP considers that these impacts can be managed acceptably provided the remaining vegetation within the mining lease is enhanced with revegetation of the Sandy Creek and Meteor Creek riparian areas so as to mitigate and maintain connectivity between the protected estate and the State forest.

#### 4.14.2.3 Aquatic ecology

The EIS identified key potential impacts and the aquatic receptors that would potentially be impacted by mining activities. Vegetation clearing and earthworks were identified as having a high potential for soil erosion and sedimentation without appropriate mitigation measures. According to the EIS baseline water quality condition of moderately high turbidity indicates small increases in turbidity would not have a significant impact on aquatic ecology. The EIS concluded that potential nutrient and contaminant runoff would likely be low where appropriate stormwater, sediment and erosion control measures are in place.

Construction would lead to the loss of ephemeral drainage lines and gullies; however these areas were not quantified or identified on a map(s) or figure(s) in the EIS.

##### **Base flow and the alluvial aquifer**

Modelling presented in the EIS indicated that groundwater levels within the saturated alluvial aquifer would decrease through drainage of groundwater through connected alluvial areas to the pits created through mining operations. The EIS noted that this potential loss of shallow alluvial groundwater would be limited to alluvium directly connected to the pits and its general occurrence was limited to the Meteor Creek alluvium. The up and downstream extent of alluvial drainage was limited by the Consuela anticline and a basalt barrier respectively. Within the immediately affected middle reaches there would be a total permanent loss of groundwater base flow in Meteor Creek. Downstream of the sandstone barrier there would be a significant, approximately 52%, reduction in annual base flow including the reaches of Meteor Creek within Albinia National Park. The EIS noted that Meteor Creek was an ephemeral stream and that the average number of no flow days, including in the national park would increase by 57 from 74 days to 131 days per year. The impact to base flow is expected to be permanent as the final voids would continue to be groundwater sinks even post equilibrium (greater than 150 years post mining)

The EIS stated that no other watercourses are expected to lose groundwater base flow as they are not directly connected through the alluvium to the mine pits and final voids.

The EIS concluded that the likelihood of adverse impact to aquatic ecosystems from the predicted losses of base flow in Meteor Creek is low due to:

- sufficient surface flows being maintained to support the ecology of the streams
- the streams being associated with the alluvial aquifer, not hydraulically connected to the deep basalt aquifer
- the ephemeral nature of the streams and the resilient nature of the flora and fauna.

##### **Wetlands**

According to the EIS one wetland (ID 45027) within ML70307 would be cleared as it is located within the expansion of the proposed Meteor South (B) Pit. The EIS notes that the impacts on this wetland would be substantial but it did not quantify or analyse the aquatic habitat values that would be lost or the total area impacted. Appendix M-1, Aquatic Ecology Technical Report described the wetland as 'not a natural feature', having been formed by the damming of a tributary of the Sandy Creek. The EIS described the wetland to be in a slightly to moderately disturbed condition and was considered to be no less or more representative or unique than other wetlands surveyed.

Survey sites were scored using the Australian River Assessment System (AUSRIVAS) sampling methodology with River Bio-assessment scores determining macro-invertebrate health of aquatic habitat. The wetland scored 'moderate' under this methodology. The Queensland Government's Aquatic Conservation Assessment (ACA) for the GBR Catchments was also considered. However, the EIS's technical report referred to only one ACA criterion (representativeness) scoring a 'very high' rating that elevated the wetland to a WPA status. EHP notes that this is incorrect; an overall AquaScore of 'high' was derived from five criteria (out of seven) scoring 'high' or 'very high'.

EHP notes that wetland (ID45027) is approximately 6.8ha in area, and when including the 500m trigger area (or buffer) is approximately 197ha. The wetland is also mapped as palustrine regional ecosystem RE11.3.27b (listed as least concern) being open water with aquatics and emergents, often with fringing woodland. The Queensland Wetland Program maps the wetland as unmodified. The survey description in Appendix M-1 described the wetland as being surrounded by trees with a riparian zone of approximately 20m. This contrasts with a riparian zone of 2m for other surveyed sections of the adjacent Sandy Creek. It appears that the EIS has not accurately conveyed the ecological condition and value of wetland (ID 45027).

The EIS indicated that wetlands would also be cleared corresponding to sections of Meteor Creek on MLA70458 and MLA70416. However, no details were provided in the EIS as to its exact location, quantification of area or aquatic habitat values. Catchment modification would also likely result in changes to ground and surface flows and water quality. No analysis was provided in the EIS to quantify the likely nature and scale of these changes. The EIS has not appropriately addressed the values of wetlands potentially impacted by the project nor assessed the nature and scale of impacts to them.

## **Riparian areas**

The EIS stated that approximately 5.25km of riparian areas associated with Sandy Creek would be lost as part of the proposed creek diversion and subsequent mining activities. No specific details were provided in the EIS as to the exact stretch of the Sandy Creek that would be cleared or the aquatic habitat values that would be lost. EHP desktop analysis of the Sandy Creek drainage network indicates the natural meandering stretch of this watercourse is approximately 8km in length. The 5.25km figure reported in the EIS appears to be a direct line between the start of the creek diversion to where it joins Meteor Creek. The potential impact of the creek diversion is therefore likely greater than presented in the EIS. The full loss of the SSBV remnant watercourse vegetation would be required to be offset under the QBOP.

## **Groundwater depressurisation**

According to the EIS, permanent groundwater depressurisation of the fractured basalt aquifer is likely to extend over an area of approximately 43,000ha, including significant areas (over 3000ha) of Albinia National Park. Within that basalt aquifer the model indicated reduction in groundwater potentiometric surfaces in the order of 1 to 5 metres outside the mining lease, and at greater levels within the mining lease.

The EIS stated that an effectively homogenous fresh basalt layer confined the aquifer at depths of generally over 20m below ground level and that available bore hole data confirmed that rock and regolith above that layer were unsaturated. The EIS also asserted that there was little or no likelihood of a connection between the alluvium and the deep basalt aquifer.

The EIS reported that significant long term impacts to stygofauna are not anticipated, but there is recognition that a localised loss of stygofauna communities is likely to occur in the project footprint and in areas subject to groundwater depressurisation.

## **Groundwater dependent ecosystems and Albinia National Park**

The EIS stated, on its earlier assumed basis of little or no likelihood of a connection between the alluvial sediments and the deep basalt aquifer, that there are unlikely to be any impacts to GDEs within the groundwater depressurisation zone other than those described as associated with the Meteor Creek alluvium. In other words, that the basis of the impact assessment in the EIS was that depressurisation of the basalt aquifer was not expected to directly or indirectly impact any terrestrial flora or fauna. Refer to the section 4.12 of this EIS assessment report for further details.

However, the EIS stated that up to approximately 430ha of alluvial GDEs could be impacted from the project. Of that area, approximately 121ha of potentially impacted alluvial GDEs was mapped off the mining lease and included an estimated 2.49ha within Albinia National Park, a Category A Environmentally Sensitivity Area (ESA).

The EIS discussed that groundwater impact modelling was conservative, i.e. it indicated a higher than likely scale of impact, and concluded that the likelihood of adverse impact to these offsite alluvial GDEs was low.

Both EHP and NPRSR noted that significant impacts from mining on Category A ESA and National Park values respectively, would be unacceptable and that for the project to be acceptable the project will have to demonstrate there will be no significant detrimental impacts on those values.

If the project does proceed, an effective monitoring program is considered essential. That program should be developed with the intention of confirming the no impact outcome and incorporate suitable management responses to impose restitution and rehabilitation and to prevent any further impacts if they are detected. Such a monitoring program should be developed to the satisfaction of EHP, QPWS, DNRM and DOE and included into the relevant section of the EM plan as part of the amended EA application.

### **4.14.3 Avoidance, mitigation and management measures**

The EIS proposed mitigation measures that included a combination of practises that would likely avoid, minimise, mitigate or compensate for impacts on ecological values. The EIS stated that as the project would be an expansion of the existing RCM a number of existing practices that were demonstrated to be effective would be incorporated into the mitigation measures for the expansion project. Proposed mitigation measures included:

- minimisation of disturbance footprint through design
- provision of access to natural water supplies for native wildlife
- usage of the operational footprint or previously disturbed/lower value fauna habitat areas for ancillary or temporary lay down areas
- riparian corridor fencing at road crossings to direct fauna into underpasses
- lighting installation to avoid direct illumination of riparian and woodland habitat areas, and where necessary use of shading devices to restrict illumination

- employment of suitably qualified and experienced environmental staff during construction, operation and decommissioning phases
- internal regulation of vegetation
- delineation of vegetation to be disturbed
- clearing to be staged and directional to allow mobile fauna to move away
- treatment of injured wildlife, including transport to wildlife carer or vet
- fauna survey and translocation prior to clearing - medium and large tree hollows and nests to be inspected by fauna spotter/catcher prior to clearing
- relocation of medium and large hollows and logs to non-mining areas for fauna habitat
- collection of native plant seed, rocks and logs prior to clearing for rehabilitation use
- vehicle speed limited to 70km/hour on the project site
- exotic plant control strategies:
  - physical and chemical treatment methods
  - selective topsoil stripping and stockpiling
  - vehicle washdown
- animal pest control strategies:
  - limitation of artificial food sources
  - baiting and trapping
  - participation in syndicated regional control programs
- progressive rehabilitation of disturbed areas larger than 5ha with native species within 18 months of mine completion
- rehabilitation of a 100m wide riparian corridor along the Sandy Creek diversion to maintain landscape connectivity between Mount Hope State Forest, Mount Pleasant State Forest and Albinia National Park. This rehabilitation would include natural vegetation similar in density and diversity to that of remnant undisturbed areas
- rocks and logs placed in rehabilitated landscapes to provide fauna habitat
- undertake semi-evergreen vine thicket revegetation trials
- implementation of appropriate fire management regimes that consider fauna habitat requirements
- encouragement of natural regeneration of vegetation within non-mining areas with the maintenance of ground cover, leaf litter and understorey structure by undertaking rotational grazing practices.

#### 4.14.4 Offsets

The EIS provided an offset strategy that proposed offsets to counterbalance estimated residual impacts on MNES and SSBV after implementation of proposed avoidance, minimisation and mitigation measures. XCQ proposed to acquit most of the offset requirements on the Meteor Downs property, which is owned by XCQ. XCQ also carried out a desktop assessment to identify offset availability within a 200km radius of the project area. As a result of this landscape assessment, XCQ was confident that there were sufficient offset areas available to fulfil the project offset obligations for all MNES and SSBVs.

EHP recommended in its comments on the EIS that XCQ submit their Offset Strategy in accordance with the new *Environmental Offsets Act 2014* requirements. XCQ responded that the Offset Strategy presented was in accordance with the Queensland Biodiversity Offset Policy V1, 2011 (QBOP) as their application to amend their EA was lodged with EHP prior to 1 July 2014 and therefore they proposed to provide offsets for the project in accordance with the offset strategy presented in Volume 3 of the EIS. EHP accepts this offset delivery framework.

The offset requirements of the project under the EPBC Act Environmental Offset Policy (2012; EOP) and the QBOP were estimated based on an assessment of the significant residual impacts of the project on MNES and SSBV and presented in the Offset Strategy (Volume 3 of the EIS).

Table 5 lists the SSBV values likely to be impacted and indicates which SSBVs are also MNES. It is sourced from the Offset Strategy, and Chapter 13 and Chapter 14 of the EIS.

**Table 5 State significant biodiversity values likely to be impacted (MNES duplicate values indicated)**

State significant biodiversity value	Description	Area (ha) in project area	Area to be impacted (ha)

State significant biodiversity value	Description	Area (ha) in project area	Area to be impacted (ha)
Endangered regional ecosystems	RE 11.4.9 <sup>1</sup>	35	27
	RE 11.4.8 <sup>1</sup>	2	2
	RE 11.8.15	31	10
Endangered HVR regional ecosystem	HVR 11.4.9 <sup>1</sup>	15	14
Of concern regional ecosystems	RE 11.3.2	96	49
	RE 11.3.3	137	61
	RE 11.3.4	34	2
	RE11.8.11 <sup>1</sup>	1,621	988
	RE 11.8.11a <sup>1</sup>	376	250
	RE 11.9.4 <sup>1</sup>	1	1
Endangered grassland regional ecosystem	RE 11.3.21 <sup>1</sup>	80	73
Protected plants under NC Act	<i>Cyperus clarus</i> (V)	5,547	3,452
	<i>Desmodium macrocarpum</i> (NT) <sup>2</sup>	1,204	531
	<i>Trioncinia retroflexa</i> (E)	1,751	1,112
	<i>Aristida annua</i> (V) <sup>1</sup>	5,547	3,452
	<i>Dichanthium queenslandicum</i> (V) <sup>1</sup>	1,751	1,112
	<i>Digitaria porrecta</i> (NT) <sup>2</sup>	5,547	3,452
Protected animals under NC Act	Rough collared frog (NT) <sup>2</sup>	7,007	1,744
	Common death adder (NT) <sup>2</sup>	7,025	2,498
	Ornamental snake (V) <sup>1</sup>	2,986	1,786
	Brigalow scaly-foot (V)	4,898	2,826
	Black-necked stork (NT) <sup>2</sup>	115	23
	Squatter pigeon (southern) (V) <sup>1</sup>	5,086	2,891
	Black-chinned honeyeater (NT) <sup>2</sup>	5,086	2,891
	Cotton pygmy-goose (NT) <sup>2</sup>	115	23
	Australian painted snipe (V) <sup>1</sup>	115	23
	Black-breasted button quail (V) <sup>1</sup>	193	51
	Little pied bat (NT) <sup>2</sup>	5,086	2,891
	Short-beaked echidna (SLC)	Not provided	4,347
	Essential habitat	Little pied bat (NT)	



State significant biodiversity value	Description	Area (ha) in project area	Area to be impacted (ha)
Watercourse vegetation	Stream order 1 and 2	435	237
	Stream order 3 and 4	619	401
	Stream order greater than 4	304	23
Wetland RE <sup>3</sup>	RE 11.3.27	79	23
Connectivity	State significant corridors - BPA	413	78

<sup>1</sup> EPBC listed MNES values and offset requirements determined by Commonwealth

<sup>2</sup> SSBV with near threatened values that no longer require offsetting

<sup>3</sup> The Wetland RE may not accommodate all of the WPA or its support area. If not then an additional SSBV should be included for impacts to WPA

#### 4.14.5 Outstanding issues

##### Regional Ecosystems Mapping

EHP requested that XQC seek Queensland Herbarium review and acceptance of the revised regional ecosystem mapping for the proposed project area. XQC has subsequently submitted their revised mapping to EHP for Queensland Herbarium review and are awaiting a response. Table 6 of this assessment report presents an overview of the potential impacts on vegetation based on the existing regional ecosystem mapping certified by the Queensland Herbarium. The REs that would be affected by the project, and the extent of those impacts, were determined by EHP using certified RE mapping and spatial data for the project footprint provided by XQC. It is likely that the Queensland Herbarium certification process for XQC's revised RE mapping would result in changes in the areas shown in Table 6. If aspects of XQC's mapping are not accepted, this would have implications for offsets required. Outstanding aspects of the impact assessment noted earlier would also need to be resolved and quantified prior to determining the full extent of impact and offset requirement should the project proceed.

**Table 6 Regional ecosystems, using Queensland Herbarium mapping, in the project impact area (Source: EHP\*)**

Regional ecosystem	Description	VM Act class <sup>1</sup>	Biodiversity status <sup>2</sup>	Corresponding TEC <sup>3</sup>	Total area on project site (ha)	Area to be cleared (ha)
11.3.1	<i>Acacia harpophylla</i> and/or <i>Casuarina cristata</i> open forest on alluvial plains	Endangered	Endangered	Brigalow	3.5	0
11.3.2	<i>Eucalyptus populnea</i> woodland on alluvial plains	Of concern	Of concern		242.7	104.3
11.3.3	<i>Eucalyptus coolabah</i> woodland on alluvial	Of concern	Of concern	Coolibah-black box woodland	166.8	0
11.3.3a	Riverine wetland or fringing riverine wetland	Of concern	Of concern		434.8	385
11.3.4	<i>Eucalyptus tereticornis</i> and/or <i>Eucalyptus</i> spp. tall woodland on alluvial plains	Of concern	Of concern		433.9	385
11.3.6	<i>Corymbia</i> spp. woodland on alluvial plains	Least concern	Of concern		108	49.5
11.3.21	<i>Dichanthium sericeum</i> and/or <i>Astrelba</i> spp. grassland on	Endangered	Endangered	Natural	40.1	0

Regional ecosystem	Description	VM Act class <sup>1</sup>	Biodiversity status <sup>2</sup>	Corresponding TEC <sup>3</sup>	Total area on project site (ha)	Area to be cleared (ha)
	alluvial plains. Cracking clay soils			grassland		
11.3.25	<i>Eucalyptus tereticornis</i> or <i>E. camaldulensis</i> woodland fringing drainage lines	Least concern	Of concern		270	67.5
11.3.27	Freshwater wetlands	Least concern	Of concern		31.3	23
11.4.9	<i>Acacia harpophylla</i> shrubby woodland with <i>Terminalia oblongata</i> on Cainozoic clay plains	Endangered	Endangered	Brigalow	73	2.3
11.8.5	<i>Eucalyptus orgadophila</i> open woodland on Cainozoic igneous rocks	Least concern	No concern at present		3002.5	1885.8
11.8.11	<i>Dichanthium sericeum</i> grassland on Cainozoic igneous rocks	Of concern	Of concern	Natural grasslands	2816.4	1716.7
11.9.1	Semi-evergreen vine thicket and microphyll vine forest on Cainozoic igneous rocks; lowlands	Endangered	Endangered	Semi-evergreen vine thickets	4.6	1.7
11.9.12	<i>Dichanthium sericeum</i> grassland with clumps of <i>Acacia harpophylla</i> on fine-grained sedimentary rocks	Endangered	Endangered		46.2	0
11.9.2	<i>Eucalyptus melanophloia</i> +/- <i>E. orgadophila</i> woodland on fine-grained sedimentary rocks	Least concern	No concern at present		0.9	0.9
Non-remnant					5192	971.7

<sup>1</sup>Data derived from calculating the area of REs on the certified REDD data with digital data on the footprint of the project provided by XCO

<sup>1</sup>VM Act class - Conservation status under the VM Act

<sup>2</sup>Biodiversity status - Conservation status under the EP Act

<sup>3</sup>TEC – Threatened ecological community under the EPBC Act

<sup>4</sup>HVR – High value regrowth – not quantified by EHP

## Wetlands

The EIS did not adequately address the loss of the wetland (ID 45027) on site. This type of wetland is a MSES which is a prescribed environmental matter under the Environmental Offsets Regulation 2014. It is also a SSBV under the QBOP under which this project is being assessed. Resource activities carried out under an EA under the EP Act are subject to offset assessment for residual impacts to SSBVs under the QBOP. The EIS Aquatic Ecology chapter and the offset strategy chapter (refer to Table ES2: QBOP Offset Requirements) do not specifically recognise this wetland as an offset. However, EHP noted that the wetland RE 11.3.27 is listed as an SSBV requiring an offset under Table ES2 QBOP offset requirements. Further clarification is required as to whether any of the WPA has been included in this table. An offset for a WPA must include the high ecological significance wetland and the surrounding trigger area as described above.

The EIS indicated that wetlands would also be cleared corresponding to sections of Meteor Creek on MLA70458 and MLA70416. However, no details were provided in the EIS as to its exact location, quantification of area or aquatic habitat values. Catchment modification would also likely result in changes to ground and surface flows and

water quality. No analysis was provided in the EIS to quantify the likely nature and scale of these changes. The EIS has not appropriately addressed the values of wetlands potentially impacted by the project nor assessed the nature and scale of impacts on them. Such issues will need to be resolved prior to the issuing of the EA for the project.

### **Watercourses**

Remnant watercourse vegetation associated with Sandy Creek would be cleared due to its diversion. Quantification of the impacted watercourse vegetation (bed and banks; stipulated buffer beyond the outer banks) and a suitable offset is required as per the QBOP.

### **Groundwater depressurisation and Albinia National Park**

Both EHP and NPRSR note that impacts from mining to Category A ESA and National Park values respectively, are unacceptable and that for the project to be acceptable the project will have to demonstrate that there will be no significant detrimental impacts on those values.

If the project does proceed, an effective monitoring program is considered essential. That program should be developed with the intention of confirming the no impact outcome and incorporate suitable management responses to impose restitution and rehabilitation and to prevent any further impacts if they are detected. Such a monitoring program should be developed to the satisfaction of EHP, QPWS, DNRM and DOE and included into the relevant section of the EM plan as part of the amended EA application.

## **4.14.6 Conclusions and recommendations**

EHP is of the view that the ecology assessment in the EIS has largely met the requirements of the TOR. However, a wet season survey was not undertaken in 2012 leading to uncertainty that all aquatic ecology values were considered and or offset in the EIS and offset strategy. XCQ has made appropriate commitments to manage, monitor and rehabilitate disturbed areas to achieve appropriate ecological outcomes. EHP recommends that further efforts to survey aquatic ecosystems in the wet season be undertaken.

XCQ should, prior to commencement of works on-site, update the biodiversity offset strategy to be consistent with the requirements of the EP Act and QBOP, to reflect any changes resulting from Queensland Herbarium verification of XCQ's regional ecosystem mapping and additional aquatic surveys, and to be consistent with any relevant conditions of approval under the EPBC Act.

Following Commonwealth assessment and approval under the EPBC Act 1999, should that occur, XCQ would be required to provide a suitable offset proposal that would acquit the requirements of EPBC Act offset policy and QBOP for impacts to MNES and SSBVs respectively.

Draft conditions for an EA for the project are stated in Appendix A. These conditions would need to be modified to include maximum disturbance areas for each SSBV as detailed in Table 5. Conditions must also require that offsets are provided for all impacts to SSBVs.

XCQ is to ensure restoration works, including the planting of vegetated riparian buffers associated with Sandy Creek and Meteor Creek, are undertaken to enhance waterway connectivity (aquatic and terrestrial); connectivity between Mount Hope State Forest and Albinia National Park; and improve water quality and habitat values for aquatic biodiversity. Restoration should be of the dimensions and native species composition that results in ecologically functional corridors into the long term.

XCQ should liaise with EHP's wildlife management branch to determine whether clearing permits and or species management plans under the NC Act would be required under the Nature Conservation (Wildlife Regulation) 2006.

It is recommended that the Offset Strategy be updated to account for the conclusion of outstanding matters such as groundwater depressurisation, the loss of the HES wetland (W1) and the full extent of watercourse vegetation cleared as a result of the diversion of Sandy Creek. Electronic shape files in a format compatible with ArcGIS (as per the TOR requirements) must be provided detailing the area of Sandy Creek that would be cleared. Any, consequential EA must include the requirement for an offset area management plan as per the information requirements under section A3 of the QBOP.

A detailed survey of the WPA (i.e. wetland and trigger area) must be undertaken to establish all aquatic values that would be potentially impacted. XCQ should note that this would include a wet season survey to account for the full seasonal range of ecological values of the wetland. The TOR specifically required that surveys were sufficient to identify plant and animal values over the range of seasons, particularly during and following a wet season and the EIS is deficient in this respect.

Further assessment would be required to adequately address the wetland values listed under section 81A of the EP Regulation. XCQ should note that EHP's Wetland Field Assessment Toolkit is currently being developed to enable rapid and transparent site-based assessment of the status of lacustrine and palustrine wetlands and their environmental values and risk factors; WetlandInfo at EHP can provide further detail.

More detail is required in the EM plan to include management plan(s) that incorporate objectives, performance criteria, accountabilities and compliance activities for:

- the rehabilitation and maintenance of Sandy Creek in both the reach upstream of the creek diversion and downstream of the creek diversion of Meteor Creek to enhance aquatic habitat values
- the maintenance of the ecological values of waterways and all wetlands (both WPA and WMA) affected by project works via buffer area restoration works.

The EIS provided an adequate assessment of the likely presence of listed communities, species and migratory species on the project site, as well as potential impacts on these values, due to project activities causing direct disturbance. Suitable offsets for these impacts are expected to be available.

Several submissions were received on the EIS relating to potential environmental impacts of the modelled hydrological changes. Those concerns were highlighted by submissions from the IESC, DNRM and NPRSR. Both EHP and NPRSR note that impacts from mining to category A ESA and National Park values respectively, are unacceptable and that for the project to be acceptable the project will have to demonstrate that impacts to those values would not occur.

If the project does proceed, an effective monitoring program is considered essential. That program should be developed with the intention of confirming the no impact outcome and incorporate suitable management responses to impose restitution and rehabilitation and to prevent any further impacts if they are detected. Such a monitoring program should be developed to the satisfaction of EHP, QPWS, DNRM and DOE and included into the relevant section of the EM plan as part of the amended EA application.

Importantly, reviewers of the EIS have either accepted the groundwater modelling presented in the EIS or their residual concerns about modelling have been effectively addressed in the amended EIS. Consequently, the modelling of groundwater depressurisation provided in the EIS is apparently a suitable basis to delineate the potential impact areas, including for off-lease areas. The EIS stated that groundwater impact modelling was conservative, that is, it indicated a higher than likely scale of impact, and concluded that the likelihood of adverse impact to these offsite alluvial GDEs was low.

## **4.15 Transport**

### **4.15.1 Existing values**

According to the EIS the transport infrastructure used by the existing mine would be used by the planned expansion project. The infrastructure network consists of sea ports, airports, rail and road. Additional traffic generated by the project relates to four main activities: equipment, materials (including wastes), workforce and coal product.

### **4.15.2 Impacts**

#### **4.15.2.1 Road impacts**

The mine is primarily accessed using the RCM access road which connects directly from the state-controlled road network via the Dawson Highway. No access to the regional council road network is expected. However, the realignment of an existing local road (Springwood Road) which is currently a formed gravel access road, as well as the re-alignment of an existing (unformed) road reserve (Mount Kelman Access Road Reserve) would be required.

The percentage of traffic attributable to the project is concentrated in the immediate vicinity of the mine and generally decreases with distance. Predicted generated traffic movements are expected to peak in year 10 and consist of approximately 390 additional vehicle trips per day across four transport corridors for the estimated total mine workforce of 1030. The majority of trips would be by light vehicle only. All heavy vehicle trips including trips relating to construction materials and the transportation of the workforce by bus, bus-in bus-out (BIBO), are expected to occur along the Townsville corridor through Bowen, Mackay and Emerald.

A Road Impact Assessment (RIA) was undertaken for the EIS, in accordance with the Guidelines for Assessment of Road Impacts of Development (GARID), and as required by the TOR. In the RIA, a traffic impact assessment and a pavement impact assessment were prepared for the construction and representative operational years. Road sections that were calculated to have a ratio greater than 5% between the total daily development traffic and the existing 2013 background traffic volumes were identified as having a significant impact. Twenty-two road sections were identified as having a significant impact in the majority of the first 10 operational years of the project.

The EIS road traffic analysis indicated that the Carnarvon Highway, Gregory Highway and Dawson Highway would be most impacted by the project. The majority of impacts are expected to be due to light vehicle trips for the external workforce for the Carnarvon Highway, light and heavy vehicles for the Gregory Highway and a combination for the Dawson Highway. The highest level of impact between the townships of Banana and Springsure on the Dawson Highway is expected to be attributable to the roster changeover of the external workforce and is not considered an everyday occurrence. The segment of the Dawson Highway between Rolleston and Springsure (referred to as 46D) would have the highest overall impact because the RCM access road directly connects here. The highest predicted increase in traffic from background 2013 levels for this segment is estimated at 35.6%.

A pavement impact analysis compared the existing traffic annual average daily traffic or equivalent standard axles (ESA) against project generated ESAs for the same road sections as those assessed for the RIA. The percentage comparison analysis aligned with the RIA with modelling indicating the highest impact of 58.8% above background levels in Year 6 for road section 46D.

The EIS stated that impacts on the road network from the transport of materials and equipment are considered to be insignificant due to their infrequent nature. The peak number of heavy vehicle movements is expected to be approximately 20 per day during Year 6 via Mackay or Emerald. 70% of these trips are related to the transport of construction materials, 20% are for the transport of project waste and 10% are for the movement of the BIBO workforce. The operational safety and management of these heavy vehicle trips on the road network would be considered as part of the Road use management plan (RUMP) and Traffic management plan (TMP). The potential impacts of oversized movements on the road network would be undertaken as part of the approvals process for obtaining permits regulated by DTMR.

The EIS stated that the re-alignment of Springwood Road is required to maintain public access while facilitating the additional area of mining required for the expansion project. It would not be used by heavy mine vehicles. Two options have been developed for the project. Option one is XQC's preferred choice as it is entirely within the lease and is the shorter of the two corridors. It is located on a non-mining area of MLA70416 and MLA70458. Detailed design and consultation with DTMR, DNRM, CHRC, adjacent landholders and regional emergency services is proposed post EIS. There is the potential for the road to be impacted by flood waters from the breaching of the Meteor Creek levee. XQC has committed in the EIS to developing appropriate flood mitigation measures to be developed during the detailed design stage.

According to the EIS, the re-alignment of the Mt Kelman Access Road is required to facilitate the expansion of the area of mining and to maintain future public access. Preliminary discussions with CHRC have commenced and would continue post EIS.

A road intersection review identified four intersections where project generated traffic would be required to perform turning manoeuvres:

- Bruce Highway/Dawson Highway at Calliope
- Carnarvon Highway/Dawson Highway at Rolleston
- Dawson Highway/Mine Access Road west of Rolleston
- Gregory Highway/Capricorn Highway at Emerald.

The second intersection at Carnarvon Highway/Dawson Highway, immediately south of Rolleston was identified in the EIS as the only intersection that does not have protected right turn pockets and or left turn deceleration lanes in place. Further analysis indicated the intersection is likely to operate within acceptable operational limits taking account of the additional traffic flows and would not be significantly impacted as a result of the expansion project.

The EIS assessed the impact of the project's transport corridors on stock routes, with four stock routes identified as potentially being impacted, but only one primary route on the Dawson Highway between Rolleston and Springsure. The magnitude of impact was not assessed and no mitigation measures were suggested.

Potential transportation dust impacts from internal haulage roads in considered in section 4.8 and traffic generation noise and vibration impacts is address in section 4.16 of this EIS assessment report.

#### **4.15.2.2 Rail impacts**

According to the EIS, the existing rail infrastructure at the mine site would be used for the expansion project including the rail line and train load out facility (TLO). Coal would be transported from the mine site to the Port of Gladstone (a distance of approximately 424km) via Aurizon's rail network referred to as the Blackwater Rail System. Any planned future upgrade to the existing Bauhinia Branch Line (that services the existing RCM) would be managed by the relevant rail infrastructure operator and be subject to a separate approvals process.

The EIS estimated that rail traffic generated by the expansion project would result in two additional trains per day. This is based on the ultimate full-scale output of 19Mt/yr compared with the existing material output of the mine of approximately 10Mt/yr. The EIS stated that the project is likely to generate an additional 726 trains/yr which is equivalent to a 10% increase from the current rail traffic. The EIS noted that the data used for the total number of rail services along Aurizon's Blackwater Rail System is from 2009–10 as the 2010–11 services were heavily disrupted due to flood events.

#### **4.15.2.3 Sea port impacts**

According to the EIS, the existing RCM exports coal product from the RG Tanna Coal Terminal (RG TCT) at the Port of Gladstone (PoG) but a new coal terminal located at Golding Point called the Wiggins Island Coal Export Terminal (WICET) would be available for additional coal product generated by the expansion project. The use of this port has been environmentally assessed and approved as part of the WICET approvals process.

Projected shipping traffic as a result of the project is an additional 56 vessels/yr at full ROM coal production (i.e. 19Mt/yr). Based on existing shipping traffic forecasts for the PoG this equates to a 3.7% increase on existing traffic levels. The EIS noted that vessels of much greater capacity than the standard modelled (90,000t capacity) would be permitted to berth at both RGTCT and WICET (up to 220,000t). If these vessels are used then the projected increase in shipping traffic volume would be less. The EIS stated that the project would not significantly impact the operation of the PoG or the environmental values related to dust, noise or lighting and would not require additional port infrastructure.

#### **4.15.2.4 Airport impacts**

The EIS stated that Emerald Airport would be the primary airport used with a smaller number of chartered flights using the Rolleston Aerodrome. An assessment of FIFO employee movements through Emerald Airport forecasts 68 additional two-way people movements per week in years 9 and 10 when the operational workforce is expected to peak. This would equate to one to two additional aircraft movements per week (assuming the current average aircraft capacity of 48 seats) or an estimated 1.3% increase in peak air and passenger movements. The EIS concluded that the project would not have a substantial impact on the existing airports or upon environmental values such as air, noise and dust associated with air transport.

### **4.15.3 Avoidance, mitigation and management measures**

The EIS did not propose mitigation measures for:

- sea ports – as the increase in shipping traffic at the PoG of 3.7% is not considered significant
- airports – as the increase in air traffic at Emerald Airport of 1.3% is not considered significant. The increased movement of the FIFO workforce on air transport infrastructure is considered to be a joint issue for the relevant airlines and CHRC
- rail – as the increase in rail traffic generation of 10% would be appropriately managed by the Rail Infrastructure Manager (Aurizon) and rolling stock operator
- roads.

The EIS summarised proposed mitigation measures for:

- coal dust, using the current practice of profiling and veneering of coal in wagons
- road traffic via revision of the RIA and development of a RUMP prior to construction works. The RUMP would require approval by DTMR prior to implementation and would address the:
  - latest traffic generation statistics
  - pavement impact assessments
  - road safety review including sight access at intersections
  - fatigue counter measures
  - mitigation strategies to address road maintenance and worker/driver fatigue
- road re-alignment for Springwood Road, with the construction method chosen of maintaining access to the current road, while constructing the new one seen as minimising impacts to existing users and potential stock movements.

#### **4.15.4 Outstanding issues**

According to the EIS the 5% comparison analysis indicates the project would significantly impact the traffic operation of the Carnarvon, Gregory and Dawson Highways. The EIS did not address mitigation measures such as contributions to road works, rehabilitation and maintenance of State-controlled roads.

A detailed map of the proposed re-alignment of Springwood Road should be provided showing the proposed routes of the two options. The construction of the preferred option one may have potential impacts on Sandy Creek and Meteor Creek. Potential impacts and proposed mitigation measures on the watercourse values should be provided.

The cumulative transport impacts section of the EIS does not thoroughly examine developments located near to the site and their potential relative and combined magnitude of impact on the existing transport infrastructure. Only one project (Meteor Downs South Project) out of the seven developments located near to the site was assessed in the EIS. The uncertainty surrounding the impact of this project on the surrounding road network should be assessed post EIS in further consultation with DTMR and CHRC.

#### **4.15.5 Conclusions and recommendations**

The EIS stated that the project has been assessed as having no significant residual impacts to sea ports, airports or rail infrastructure. There are anticipated impacts to the road transport network but further refinement of the RIA, as well as the development of a RUMP with identified mitigation measures, is expected to reduce impacts to an acceptable and manageable level.

It is recommended that Xcq liaise with DTMR to finalise a detailed road link assessment that quantifies the impact of project generated traffic on affected roads and the safety and amenity of other road users. A RUMP that incorporates appropriate mitigation measures should be developed and approved in accordance with DTMR's Guide to Preparing a RUMP. Further consultation with DTMR and CHRC to refine the RUMP is required during detailed mine planning and well prior to commencement of construction.

The EIS has not adequately addressed the cumulative transportation impacts of the proposed project and other resource extraction and infrastructure developments located near the project site. It is recommended that Xcq revise its cumulative impact assessment to focus on the scale and timing of heavy truck impacts on the Dawson Highway due to the proposed Meteor Downs South Project and how this may impact on the RIA of the proposed expansion project.

Recommended road traffic and maritime safety conditions provided by DTMR are provided in Appendix C.

### **4.16 Noise and vibration**

The noise background and management commitments for mitigating likely noise impacts were described in EIS Chapter 12, Noise and Vibration as well as the draft EM plan. Detailed noise studies were undertaken and reported in EIS Appendix J1, Noise Technical Report. Blast noise and vibration impact assessments were addressed in EIS Appendix J2, Rolleston Coal Mine Expansion Preliminary Blast Impact Assessment. These documents were updated and resubmitted by Xcq as a response to EIS submissions.

#### **4.16.1 Existing values**

The EIS identified acoustic quality objectives intended to enhance or preserve the health and wellbeing of sensitive receptors and other environmental values over the long term.

The EIS defined the noise environmental values to be enhanced or protected as the health and biodiversity of ecosystems, human health and wellbeing, and the amenity of the community. The EIS proposed to protect the amenity of surrounding areas and the health and wellbeing of nearby residents. The adopted specific criteria were stated in EIS Appendix J2, Table 1. These criteria are consistent with the levels outlined in the Environmental Protection (Noise) Policy 2008 (EPP Noise) acoustic quality objectives.

Sensitive receptors within 12km of the mine comprise seven homesteads. The three closest homesteads are owned by Xcq and located between 5 and 5.5km from the project site mine pits.

#### **4.16.2 Impacts**

The EIS noise and vibration assessments included:

- baseline noise surveys
- prediction of the potential noise and vibration impacts at the nearest noise sensitive receivers
- use of modelling software (SoundPLAN 7.1) and noise contour maps (EIS Appendix J1, Noise Technical Report)

- assessment of the potential off site noise and vibration impacts from increased road or rail use
- comparison of the forecast noise and vibration levels at nearby noise sensitive receivers against the performance indicators and standards
- proposed measures for protecting or enhancing the environmental values from noise and vibration impacts, including details of any screening, lining, enclosing or bunding
- assessment of the potential impacts of noise and vibration on terrestrial animals, birds and migratory species.

### **Construction noise and vibration**

The EIS stated that construction noise and vibration levels would be similar to the current operational phases. Infrastructure additional to the existing infrastructure, including haul roads and facility upgrades would be constructed at the mine and surrounds. No modelling of construction noise was considered necessary as similar equipment would be used as is currently used operationally. The EIS made additional commitments to manage construction noise and vibration.

### **Operational noise**

For a 24 hours a day operation, the EIS defined 35dB (A) LAeq (1h) at sensitive receptors as the criterion to be achieved. Noise emissions were modelled for the worst case year 7 and year 14 mining operations scenarios.

The operation of the project in years 7 and 14 would likely produce noise levels of up to 35dB(A) LAeq (1h) at the most affected receptor (Springwood Homestead). The EIS stated that the noise level at all other receptors would likely be below 35dB(A) LAeq (1h). The predicted mine noise impact at receptors would comply with the nominated noise criteria under continued implementation of control strategies identified in the RCM EM plan.

The EIS described the Springwood Homestead as the receptor that would be subject to the highest noise levels including the highest low frequency noise impact. The noise impact at this receptor was stated as not being significantly high. The EIS also stated that XCQ owns this property.

### **Rail noise and vibration**

The EIS described the likely increase in rail traffic volumes along the Blackwater Rail System and stated that any increase in noise would be less than 1dB(A). A similar prediction was made for any vibration increase. The EIS stated that there would be no significant increase in the noise or vibration levels at receptors adjacent to the Blackwater Rail System particularly for receptors at least 50m from the rail line. No sensitive receptors were identified within 50m of the rail line.

### **Road noise and vibration**

The EIS assessed the Dawson Highway noise levels from traffic generated by the mine and proposed expansion using worst case assumptions. The EIS stated that any elevated road traffic noise would be no more than 1dB(A) at 50m from the road and no sensitive receptor was identified. The EIS concluded that there would be no significant increase in road traffic noise levels on the Dawson Highway. Vibration from road traffic would also be minor.

### **Operational vibration**

The EIS stated that the background level of ground vibration would be elevated by the following activities:

- road vehicles such as haul roads, public roads, roads on private property
- rail traffic
- activities at the existing mine including blasting, quarrying, coal processing and train loadouts.

The nearest sensitive receptor was identified as more than 1km from operations. The assessment stated that vibration levels from mine operations would be imperceptible at the nearest receiver. The EIS committed to implementation of control strategies as set out in the RCM EM plan.

### **Cumulative impacts**

The EIS briefly outlined likely cumulative noise and vibration impacts. The EIS collated publicly available information on the surrounding gas and mining projects and land use with noise and vibration impacts. The nearest proposed development identified was the Meteor Downs South (MDS) immediately north of the RCM on ML70452. This would affect receptors close to the project site to the west of the MDS project such as Meteor Downs, Mount Kelman and Croydon Hills.

The EIS found that all other projects implementing mitigation and management commitments on noise and vibration would achieve the nominated criteria. The EIS stated that mining, gas and infrastructure projects underway and proposed in the Rolleston area are not close to the project site and not of sufficient size for cumulative noise impacts at sensitive receptors identified in the EIS.



### 4.16.3 Avoidance, mitigation and management measures

The EIS stated that a number of proposed measures for managing noise and vibration impacts would incorporate existing practices as well as additional actions as, such as:

- equipment to be regularly maintained
- use of equipment with acceptable noise levels
- community complaints handling process
- awareness of how operations can affect neighbours
- design of blasting to achieve the noise and vibration criteria.

XCQ committed in the EIS to a landholder management strategy to assist directly impacted property owners to develop property land management plans to deal with dust, noise, light and visual amenity issues if they arise. This would involve communication with neighbours as well as reporting and acting on all complaints through a complaints management process.

Protected areas near the project area are prescribed under the NC Act and Nature Conservation (Protected Areas Management) Regulation 2006, including Albinia National Park (Lot 158 on NPW881) and Albinia Regional Park 1 and 2 (also called Albinia Conservation Park and Albinia Resources Reserve, Lots 567 and 1014 on NPW881). The EIS states that the ecosystem health in these areas would not be significantly impacted by noise from the project as the predicted project noise in these areas would be less than 65db(A).

### 4.16.4 Outstanding issues

The limitations of the EIS assessment included the following assumptions and limitations:

- the operational noise impact assessment was based on the modelling parameters and assumptions outlined in EIS Appendix J1, section 6.0
- only existing receptors were assessed
- operational noise was assessed based on the Year 7 and Year 14 operations nominated as worst case scenarios
- rail noise impact was assessed only for the section of rail between the project site and Blackwater rail line
- road traffic noise was assessed only for the section of Dawson Highway between the Rolleston township and Tarana Road
- no field assessment was carried out of rail or road vibration due to the low significance and likelihood of impacts stated in the EIS
- no seasonal noise assessment was undertaken as noise measurements were only undertaken in the summer season.

### 4.16.5 Conclusions and recommendations

The EIS provided a satisfactory assessment of the potential impacts to the acoustic environment.

The environmental protection noise related commitments outlined in the EIS, and EM plan and the recommendations for EA conditions for noise levels at sensitive receptors in Appendix A, of this assessment report should be considered for the development of any EA application. These conditions reflect the EHP guideline application requirements for activities with noise impacts (2012) and the relevant model mining conditions (2014).

The following recommendations should also be implemented:

#### **Recommendation – noise complaints**

In the event of noise complaints the proponent should consider implementing the following:

- further assessments in regard to the maximum sound pressure level (LA1, adj, 1 hour) inside habitable dwellings to determine if sleep is likely to be disturbed
- a noise management and monitoring strategy that includes proactive as well as reactive management strategies
- noise attenuation installed as a mitigation measure at sensitive receptors such as at residences should the noise criteria be exceeded.

## Recommendation – EA application

Any amendment to an EA under the EP Act for mining or related activities must provide:

- site-specific noise and vibration assessments for each proposed infrastructure location
- site-specific identification of sensitive receptors and potential impacts on sensitive receptors.

Impacts identified should at least meet the noise objectives in the EPP Noise. The EIS documents would support the above EA amendment application requirements for the project described.

Recommended noise and vibration EA conditions have been provided in Appendix A.

## 4.17 Economics

### 4.17.1 Existing values

According to the EIS, the gross regional product of the CHRC local government area decreased by 17.1% from the 2009–10 level to \$5.2 billion in 2010–11 due to the effects of flooding in Queensland during this period. Conversely, the five year average annual growth was reported at 0.7% per year over this period. In 2010–11 the CHRC area contributed 1.9% to Queensland's gross regional product with mining and related activities being identified in the EIS as the largest contributor, followed by the construction industry.

According to the EIS the estimated resident population of the Bauhinia Statistical Local Area (SLA) was 2250 persons in 2011. The EIS reported that the Bauhinia SLA's resident population has grown at an average annual rate of 0.5% per year, which is slower than the Queensland average. The EIS noted that the population of the Bowen Basin is expected to grow significantly in the coming decades due to the substantial mining and mineral related infrastructure developments in the Bowen and Galilee Basins, with projections of 30% growth in the population by 2031.

The EIS identified the full-time equivalent (FTE) population in the Bauhinia SLA as 2690 persons in 2011, with 10% of the FTE population classified as non-resident workers. Outside the Springsure locality, 12.9% of the FTE population were workers residing outside the Bauhinia SLA. The Bauhinia SLA had a smaller proportion of its population over 65 years and a smaller proportion of persons less than 25 years than either the CHRC area or Queensland. The Bauhinia SLA also had a lower unemployment rate than the CHRC area and Queensland.

The EIS further stated that while unemployment had increased across all regions over the period 2012–13, unemployment in the Bauhinia SLA was 2.8% in June 2013. The EIS stated that the Bauhinia SLA had a high proportion of managers reflecting a large number of rural property manager roles, while identifying the largest proportion of the labour force in Rolleston and Springsure to be machinery operators, followed by managerial positions and labourers reflecting the large number of mining workers. Rolleston also reported a higher proportion of labourers than other study areas and Queensland (11%). The EIS concluded that the low unemployment rate in the region suggested that the local labour market may be insufficient to fill the labour needs of the project. As a result, labour may need to be brought in from outside the region to fill the expected labour requirements.

Agriculture, forestry and fishing, accounted for over a third of businesses in the CHRC region. According to the EIS mining accounted for fewer than 3% of all business in the Central Highlands region. The EIS reported that the agriculture, forestry and fishing industry had an estimated industry turnover in 2009 at \$508 million, which was equivalent to 21.5% of total turnover. This was closely followed by the mining industry at \$496 million or 20% of total turnover in the region. The EIS found that the highest average turnover per business was in the mining industry with an average annual turnover of approximately \$5.6 million, followed by businesses operating in the retail trade industry with an average annual turnover of \$1.9 million. In the absence of local level data, the EIS assumed that a similar relationship between industry types would exist in the Bauhinia SLA.

The EIS identified that the total industry value add in the CHRC area with \$109 per hour worked, was double that of Queensland (\$54 per hour worked). The EIS reported that the CHRC area experienced a decrease in total industry value adds by approximately 22% between 2009–10 and 2010–11. The mining industry experienced the largest decrease in value added between 2009–10 and 2010–11. The EIS concluded that the mining industry experienced a decline in value added since 2000–01, due to a combination of a slow rate of output growth, very strong growth in the price of labour and continued growth in the cost of capital. Despite this, the EIS stated that the mining industry had the highest value added per hour in both the CHRC area and in Queensland at \$194 and \$195 per hour worked. No local data was available for Bauhinia SLA, but the EIS assumed that a similar pattern would be exhibited to the regional study area.

The EIS reported that the 47 operating coal mines of the Bowen Basin produced 180 million tonnes of saleable coal in 2009–10, contributing to a total of \$3,250.8 million to the gross regional product of CHRC area. In comparison, the EIS outlined that agriculture, mainly cropping and cattle grazing, contributed \$83 million to the gross regional product in the same period. Grazing land covered 82% of the Central Highlands catchment. Dryland cropping consisted predominantly of cereals such as sorghum, sunflower and wheat and some cotton and irrigated crops included wheat and cotton, as well as fruit trees, vine crops, melons and corn.

#### **4.17.2 Impacts**

The EIS impact assessment took into account the existing RCM, the additional and prolonged impacts on other land uses, social values, energy, house prices and demand for labour and proposed the adoption of mitigation measures. The EIS concluded that the construction phase of the project would increase industry output at a national level by approximately \$120 million in a typical year of operation. Construction would also create the equivalent of approximately 84 full-time jobs through direct and indirect impacts during a typical year. This would include benefits that are expected to flow to local businesses through construction worker expenditure.

The EIS further concluded that during the project's operational phase, the total additional economic impact (i.e. direct and flow-on impacts) would increase at a national and state level by approximately \$530 million in a typical year of operation. Total employment in a typical year of operation would see the equivalent of approximately 1200 full-time jobs would be created through direct and indirect effects.

The EIS also identified other potential impacts, including the potential increase in the price of housing, good and services, and reduce the supply of accommodation, due to increased demand. However, the EIS concluded that housing in the local area was considered more affordable than the Queensland average, and hence this impact was expected to be minor. A potential for an increase in the cost of labour was identified due to an increased demand for skilled workers. The EIS concluded that local businesses may experience a loss of employees to mining and supporting industries in search of higher wages and that employment opportunities could arise for locals that are currently unemployed or underemployed.

The EIS briefly discussed the tourism industry in the region as being focused around the natural landscapes, including Carnarvon Gorge and Carnarvon National Park. The EIS concluded that while the project would be unlikely to impact detrimentally on tourism attractions in the region, it had the potential to reduce the supply of accommodation in the Rolleston township.

The EIS concluded that, on cessation of the proposed project in 2037, the local economy may contract at all levels. The closure of the mine would result in the removal of many employment opportunities for Rolleston and Springsure residents. The extent of the contraction would depend on the extent to which the economy would be diversified and strengthened over the project life, and whether there are other investment and employment opportunities in the area at that time.

#### **Cumulative impacts**

The EIS concluded that cumulative impacts from 18 identified existing and or proposed mining projects in or close to the study area would not present significant adverse impacts to the existing economic environment, and would likely result in an overall beneficial economic impact to the region. The EIS further concluded that the cumulative demand for skilled labour would be likely high during both construction and operations. This would likely intensify the impacts described above, especially on property values and distributional effects. The EIS also concluded that the high demand for labour in a region where unemployment is low, would likely result in the need to resource from further afield. The EIS did not address the potential cumulative economic impact on other industries such as agriculture, except to say that the loss of grazing land would not represent a significant impact.

#### **4.17.3 Avoidance, mitigation and management measures**

A set of mitigation measures were identified in the EIS to reduce the magnitude of potential adverse impacts. The EIS stated that XCQ would continue to implement existing procurement policies, such as procurement and contracting based on best value, taking into account the merits of price, quality, performance, competency, compliance and suitability, including sustainability criteria. The EIS also considered mitigation of mine closure impacts as part of the existing conceptual mine closure plan. The EIS stated that five years before the scheduled closure date, XCQ would develop a detailed plan with the aim to assess the impacts of the mine closure on Rolleston, Springsure and surrounding areas, and to identify appropriate measures to mitigate potential negative impacts. No details of the proposed plan were provided in the EIS. The EIS stated that as a mitigation initiative, XCQ currently works in partnership with local communities in which it operates through its Corporate Social Involvement initiatives. Further comments on social issues are discussed separately in section 4.18 of this EIS assessment report.

#### **4.17.4 Outstanding issues**

Several comments on economic impacts, including a strong challenge from the LTGA were received on the Economic Values Chapter of the EIS. Key comments were that the economic impact assessment only estimated the contribution that the construction and mining would make resulting from the coal industry, but did not include a cost-benefit analysis or economic impact assessment of the project on agricultural businesses locally and regionally. XCQ responded to each of the comments and stated that with the exception of residual mine voids, the loss of grazing land would be temporary and limited and that XCQ would comply with its obligations under the RPI Act.

In its review of the amended EIS, LTGA suggested that the EIS failed to suitably address agricultural land values important to current and future production, including quantify the potential economic impacts on land currently used for agriculture or land with the potential use for agriculture using the Central Queensland Agricultural Land Audit, May 2013 (and amended October 2014). Furthermore, LTGA stated that the EIS did not provide a suitable cost-benefit analysis or economic assessment of the proposed mine operations on the region's agricultural industry, including to quantify the potential negative economic impacts of the project on the region's agricultural industry, including direct impacts, such as the loss of productive land and clean water, and indirect impacts, such as the dislocation of rural businesses and changes in the socio-economic fabric of the Central Highlands region.

#### **4.17.5 Conclusions and recommendations**

The EIS concluded that the project would lead to significant positive direct and indirect economic impacts as a result of the investment in the construction and operation of the project. The positive impacts are likely to be experienced at the regional, state and national level. However, the EIS also stated that the distribution of the economic impact may not be uniform across all businesses and individuals and some may experience negative economic impacts. Overall the EIS concluded that the positive economic impacts were anticipated to outweigh the negative impacts.

EHP acknowledges the contribution the project is likely to make to the economic prosperity of the region. The issue of the coexistence of mining and agricultural land uses in the Central Highlands has not been resolved by this EIS process.

The RPI Act allows for, amongst other matters, a separate approval process for potential impacts on identified Priority Agricultural Areas (PAA). The regional interests development approval process, guides an appropriate assessment process to consider the potential impacts and to consider the on-going viability of both agricultural and resource industries in the region. Ongoing consultation with DSDIP, DNRM and DAFF is required.

Land matters are further discussed in section 4.10 of this EIS assessment report.

### **4.18 Social**

In July 2013, the Queensland Government released a new Social Impact Assessment Guideline. This guideline focuses on the need for measures to effectively address identified social impacts. The assessment of social impacts in the EIS is consistent the TOR requirements for the social impact assessment. The assessment involved a literature review, baseline profile and stakeholder engagement. The key impacts and opportunities of the project were assessed, with management and monitoring measures identified to address these issues.

#### **4.18.1 Existing values**

The EIS approached the potential for social impacts by first considering the baseline community profile, then carrying out stakeholder engagement, assessment of impacts and opportunities and finally the development of a draft social impact management plan (SIMP).

The project falls within the CHRC area which was originally home to many indigenous people. Early European settlement began in the 1850's with sheep grazing. Significant growth occurred in the 1950s and 1980s with the introduction of cattle and the development of the Fairbairn Dam that supports both irrigation and coal mining. In contrast, Bauhinia Statistical Local Area which encompasses the towns of Rolleston (16km from the project site) and Springsure (58km from the project site) in which some of the existing employees live, has coal mining as a smaller role in the economy with a diverse economy based on cattle enterprises and grain farming, along with a small but significant tourist industry based on Carnarvon Gorge.

According to the EIS, the Rolleston community identified itself as a caring, friendly and close-knit, that enjoys a safe environment with a long history of community involvement and working together. The Springsure community identified itself as being a part of a safe and caring community who value our peaceful and relaxed environment. Springsure residents appreciate the variety of town services, amenities and are encouraged to be involved in the many sporting, leisure and recreational activities available. In a CHRC community survey, both the Rolleston and

Springsure communities rated highly for community satisfaction, indicative that the communities value safe, friendly places which are good for families. That survey also highlighted the isolation of these small communities, with least satisfaction in relation to the access to services and facilities, roads, drainage and flood mitigation.

Based on the Australian Bureau Statistics (ABS) Census data from 2006 and 2011, the EIS stated that base community profile established the following:

- Rolleston is a small town of 126 people and Springsure has an estimated population of 1048 people. There was a higher proportion of males in the Bauhinia SLA and Central Highlands regions compared to Queensland particularly in the 25-54 age group, there was a smaller proportion of people in the 55 and older age group and a significantly smaller proportion of people in the 15 to 19 age group (probably due to departures for boarding school and tertiary studies). Growth projections for the Central Highlands regions due to substantial resource developments are expected to increase the population by 30%. 2.6% of the Bauhinia SLA population identified as being from Aboriginal and Torres Strait Islander descent and 4.6% were born overseas.
- Residents of Bauhinia SLA had slightly lower levels of educational attainment when compared to both Central Highlands and Queensland. There are more couples with and without children than the Queensland average. There was a lower degree of disability in the Central Highlands compared to Queensland population, however Springsure has the highest proportion of people that require assistance within the Central Highlands.
- The number of enumerated people at the time of 2011 ABS Census was 209 for Rolleston (62% higher than the resident population count) and 1089 for Springsure (28% higher than the resident population count), mostly probably related to resource activity. The FTE population of the Bauhinia SLA was 2,690 people. 10% of the Bauhinia SLA population is non-resident workers of which three quarters abide in workers accommodation villages.
- There are three public hospitals in the Central Highlands region located in Emerald, Blackwater and Springsure. Rolleston is serviced by health clinics and visiting allied health professionals. The medical need of the mining workforce within the region has the potential to impact on the demand for medical and health facilities. Workers are also prone to health risk behaviours because of increased levels of alcohol intake, drug and tobacco use, obesity and overweight issues and chronic fatigue, particularly amongst shift workers. RCM has made substantial contributions towards building a health facility at Rolleston.
- Anecdotal evidence from service providers suggests that women living in mining communities, particularly those whose intimate partners are working in the mining or resource industry, may have an increased risk of experiencing intimate partner violence.
- Both Rolleston and Springsure score lowly on the Socio-Economic Indexes for Areas (SEIFA) Index of Relative Economic Advantage/Disadvantage which indicates that the area has a higher proportion of individuals with low incomes, more employees in unskilled occupations and a low proportion of people with high incomes or in skilled occupations. Bauhinia SLA has a low unemployment rate when compared to the Central Highlands RC area or Queensland average. The Central Highlands region has more people employed as machinery operators and labourers. The high proportion of managers is likely to be due to employment as managers of agricultural enterprises/properties. In Bauhinia SLA 41% of employed people worked in the agricultural industry and 13% in the mining industry, with a slight move towards more people working in mining between the 2006 and 2011 ABS Census.
- The median household income per week was higher in the Central Highlands (\$1998) and Springsure (\$1874) than Queensland (\$1453), however Rolleston was lower (\$1093). As at the week of the 11th of February 2013, there were two properties for rent in Springsure and none in Rolleston. Majority of households in the landholder rental category are paying between \$0–\$99 per week in rental costs, well below the market rent rate for the region (\$400/week at March 2011), which can be attributed to the prevalence of employer subsidised housing arrangements within the region; that includes employees and contractors for mining companies. Affordable rental stock (properties rented at a weekly rate less than 30% of the household's total weekly income) within the Bauhinia SLA decreased significantly between 2004 and 2009, with the actual numbers being very low. There is no social housing in Rolleston and 32 social housing units in Springsure. Community concerns with respect to housing are three fold—a significant increase in rental and purchase costs; loss of affordability, especially for service industry workers; and lack of availability of short-term accommodation in Springsure and Rolleston.
- Through consultation with a range of stakeholders a range of barriers to development in Springsure were identified that included: a lack of land release for subdivision; cost of building; cost of development; long approval times by council; low local development knowledge and no consensus of where growth corridor should occur.
- A shortage of short term accommodation facilities would be eliminated by the expansion of the mine's accommodation village to accommodate approximately 852 people.

- Despite the small population sizes of Rolleston and Springsure, their remoteness necessitates a higher level of services than other parts of Queensland.
- Key concerns identified by community include:
  - further increases in housing rental and purchase costs and loss of affordability for essential workers
  - expansion of existing perceived social divide; increase in road accidents, injuries and fatalities due to driver fatigue at shift changeover
  - increased demand on social infrastructure, particularly health and emergency services
  - further deterioration of the road network
  - attraction and retention of skilled labour.

At the same time, the community raised the prospect of a number of opportunities, including:

- increased local employment
- incentives for mine families to live in the towns
- affordable housing initiatives, education and training initiatives
- local procurement opportunities for small businesses
- improved engagement between the mine and local communities.

## 4.18.2 Impacts

### Population impacts

According to the EIS, XCQ has assumed a conservative mine planning approach. Due to the lack of availability of suitably qualified skilled people in the local area, the construction workforce would likely be composed of non-resident workers with the largest demand for construction workers in the first year, with estimates of 175 workers required, that would reduce to current levels of about 20 workers by year 3 of the project. The EIS stated that housing of the construction workers in the RCM accommodation village would manage this short term population increase and minimise potential impacts on the Rolleston and Springsure communities.

According to the EIS, the operational workforce required for the project would consist of both residential and non-residential workers, including a mixture of employees and contractors. The EIS estimated that operational workforce would peak in year 10 of the project with an additional 175 workers. Proportionally, the peak operational workforce demand equates to a 10% increase in combined Springsure/Rolleston FTE population and an increase of 5% in the wider Bauhinia SLA. Two thirds of this population would be non-resident workers that would be housed in the RCM accommodation village, which would reduce the population increase in the townships to a maximum of approximately 30 workers with family members (an estimated 85 people—which would be an increase of 6% of the Rolleston/Springsure population).

### Housing and accommodation impacts

The EIS stated that the majority of the operational workforce, as non-resident workers would be housed in the expanded mine accommodation facilities. These non-resident workers would be both drive-in drive-out (DIDO) and FIFO, with the current proportion of FIFO at less than 15% of the total operational workforce. According to the EIS, interaction between the non-resident workforce and the community is limited, reducing impacts on associated services of Rolleston and Springsure. The EIS stated that current feedback from the community is that non-resident workers would be welcomed at more events, especially sporting events where the community struggles to field teams. Some additional operational workforce becoming residential, could place some additional demand on the existing housing market. The actual nature and extent of impacts on housing availability and affordability would depend on the state of the housing market at the time of arrival of new workers and would be offset by the staging of workforce over time. The lag between housing demand and supply could be managed by an on-site accommodation village, which has the capacity to provide interim housing options for workers while they seek local, private accommodation.

### Directly affected landholders and near neighbour impacts

The EIS stated that in a community workshop the following issues were raised:

- the project would result in reduced options for landholders to sell their properties
- the MLA would impact on the remainder of the land and operations on the land
- the MLA would remove landholder control and created uncertainty for future property use
- concerns about need for landholders to move, affecting all generations
- impacts of time, cost and stress on landholders during the study process, negotiations with the XCQ and land access protocols.

These psychosocial impacts are difficult to measure and affect individuals and families differently. The EIS reported that these impacts on people's sense of identity, attachment to place and sense of empowerment are profound.

### **Social cohesion and community capacity impacts**

According to the EIS, participants in the consultation reported that the look and feel of the communities had changed over time since the inception of the current RCM, especially in Springsure. Typical experiences reported included the presence of orange shirts leading to perceptions of decreased safety, decreased familiarity in the town and emergence of 'haves and have nots' as a result of the higher wages associated with mining related work. General concern was that these issues would be further exacerbated by the expansion project. However, some residents perceive opportunities from the project, especially in terms of mine-community relations.

The EIS stated residents that may be disproportionately affected by the further changes brought about by the project include:

- directly affected landholders and near neighbours of the project
- single parent households
- individuals and households not receiving a mining or mining related income
- renters at marginal risk of housing stress
- individuals receiving government benefits (including aged pensioners)
- key service workers not provided with housing.

According to the EIS, there was a perception that communities were less safe. This was not supported by consultation with police or local publicans - with no reported increase of crime or incidents. The EIS stated that mine workers are subjected to strict codes of conduct governing their behaviour with issues directly reported to supervisors with potentially severe consequences.

Community consultation identified the project as a good opportunity to strengthen and increase engagement between the RCM and the community. The presence of a divide between communities' non-mining and mining residents was raised as a concern.

### **Social infrastructure impacts**

According to the EIS, health services such as Springsure hospital and the general practitioner clinic are at capacity under existing demand for services. This suggests that without adequate mitigation, clinical health services may experience a short-term moderate or greater impact during the construction phase and ongoing impact during the operational phase, given that the RCM's Workers Compensation Procedure requires that even minor ailments and injuries need to be seen by a doctor.

The EIS stated that emergency services have had a positive impact from the current RCM as workers at the mine are also members of the Springsure Rural Fire Brigade. Rolleston SES has received a high clearance vehicle funded by XCQ to assist in maintaining services during times of local flooding. However, concern has been expressed that the project could place further pressure on the Springsure Ambulance Service.

### **Traffic impacts**

According to the EIS, existing workers travel to site via single person vehicles, both daily and at the start and end of each shift for non-residential DIDO arrangements. To reduce the number of cars on the road, workers also commute via a privately contracted shuttle service from Springsure. The potential of increased traffic at shift changeover with public health and safety were raised as key concerns.

### **Mining closure**

According to the EIS the project's schedule indicates that mining activities would cease in approximately 30 years with a likely economic contraction upon cessation of mining. This economic contraction would be dependent on the degree to which the economy has diversified and strengthened over the project's life; whether there are other investment and employment opportunities in the area and whether mining families choose to leave the area. The EIS identified important tools and processes to work towards and plan for post-mine communities including:

- early and ongoing mine closure planning involving all stakeholders
- regional planning initiatives and ongoing social investment for XCQ and governments to develop the capacity of closure affected communities.

## **4.18.3 Avoidance, mitigation and management measures**

The EIS stated that there is potential to reduce many impact risks associated with the project either to a tolerable level or to a level where they can be managed through ongoing monitoring, review and efforts to further reduce the risk level. Two impacts that would require ongoing monitoring and review were identified as:

- the traffic impacts on safety and amenity at shift changeover

- the labour market impacts on local businesses.

XCQ developed a SIMP in which mitigation strategies were proposed for the key residual impacts. This information is presented in **Table 7**.

**Table 7 Key residual impact and proposed mitigation strategies identified in the SIMP (Source: EIS Chapter 17, Table 17-9)**

Potential impact	Mitigation strategies
Health, safety and amenity	
Psychosocial impacts associated with acquisition of Springwood	<p>Proposed:</p> <ul style="list-style-type: none"> <li>• partial acquisition of Springwood property</li> <li>• negotiate and effect landholder compensation agreements</li> <li>• dedicated relationship manager.</li> </ul>
Traffic accidents, injuries and fatalities at shift changeover	<p>Existing:</p> <ul style="list-style-type: none"> <li>• dedicated on-site accommodation village – no travel requirements</li> <li>• provision of daily bus transport for workers from Springsure</li> <li>• communicate and enforce Fatigue Management Policy</li> <li>• communicate and enforce Employee Code of Conduct</li> <li>• periodic review of bus service to ensure it meets workforce demands</li> <li>• periodic review of Fatigue Management Plan in consultation with employees and contractors</li> <li>• Queensland Police Service representative invited to Community reference group meetings.</li> </ul> <p>Proposed:</p> <ul style="list-style-type: none"> <li>• develop a Road Use Management Plan.</li> </ul>
Social cohesion, community capacity	
Unauthorised land access/disturbance Damage to property	<p>Existing:</p> <ul style="list-style-type: none"> <li>• adherence to Land Access Protocols and Compensation Agreements including Notices of Entry</li> <li>• engage with land owners as per draft SIMP</li> <li>• employee and contractor induction and training to include land access protocol</li> <li>• employee disciplinary policy for breaches of land access protocol.</li> </ul>
Potential for poor community engagement strategies to lead to a deterioration of mine – community relationships that could lead to social disharmony and damage to mine reputation.	<p>Existing:</p> <ul style="list-style-type: none"> <li>• Social Involvement Plan – strategies for effective community engagement</li> <li>• maintain community feedback mechanisms – via 1800 number or email</li> <li>• participation in community events e.g. stand at local shows</li> <li>• continue CSI strategies, including Community Reference Group</li> <li>• bi-annual community newsletter.</li> </ul>



Potential impact	Mitigation strategies
Business and employment	
Difficulty in attracting and retaining staff for non-mine business	Existing: <ul style="list-style-type: none"> <li>• procurement policy that provides local business opportunity</li> <li>• Rolleston Coal Conceptual Closure Plan</li> <li>• communication with key stakeholders, government and community representatives.</li> </ul>
Downturn in coal industry or unexpected closure	
Housing and accommodation	
Increased demand for housing and rental during operation that would lead to: Housing and rental shortages A lack of affordable housing for non-mining industry residents, particularly key workers	Existing: <ul style="list-style-type: none"> <li>• expand RCM village to 852 people, effectively eliminating mine need for rental accommodation in town both short and long term</li> </ul> Proposed: <ul style="list-style-type: none"> <li>• Stage introduction of new resident operation workers over time</li> <li>• 100 additional beds in workers village</li> <li>• provide timely advice to CHRC, local communities, housing and accommodation industries about potential accommodation requirements for new residential workers.</li> </ul>
Liveability and lifestyle	
Increased demand on medical services from mine employees and contractors. Increased waiting times for local GP	Existing: <ul style="list-style-type: none"> <li>• provided funding for development of new Rolleston Health facility</li> <li>• member of Rolleston Health Committee to monitor progress and operation of new health facility</li> <li>• membership of Springsure/Rolleston Community Health Advisory Network</li> <li>• have trained first aiders and emergency response team on site to provide initial response to minor injuries</li> <li>• on-site emergency response vehicle, to reduce demand on public emergency resources</li> <li>• where possible utilise Emerald medical services to minimise demand on Springsure resources</li> <li>• educate employees and contractors to reduce unnecessary demand on local health services through non-urgent visits to Springsure hospital.</li> </ul> Proposed: <ul style="list-style-type: none"> <li>• provide health services with information about changes to workforce numbers in a timely manner.</li> </ul>

Cumulative impacts were considered briefly in the EIS by outlining seven other resource projects that could occur within a 50km radius of the project. However, the EIS stated that details of construction and operation workforce numbers were not known at the time of EIS assessment. XCQ committed in the EIS to monitor resource projects in the local area to identify potential cumulative impacts and where possible seek opportunities for co-operation to address identified impacts.

#### **4.18.4 Outstanding issues**

The EIS stated that CHRC sought regular meetings with the XCQ, Queensland Police and DTMR to monitor traffic and accident statistics and road conditions as well as to partner advocating and lobbying for road improvements and maintenance through the project construction and operation phases. XCQ responded that a Road Use Management Plan would be developed and committed to meet every four months with the Queensland Police Service, CHRC and DTMR and participants of the Community Reference Group.

The DSDIP recommended in its submission on the EIS that an adaptive management approach is built into the SIMP and XCQ should also develop a method to monitor the success of the plan. XCQ responded that they would meet with the Community Reference Group three times a year to update them on the status of the project, and that they would undertake community surveys every three years to provide information for continuous improvement in community relations.

The Queensland Police Service in its submission on the EIS stated a concern about the perception that the community was unsafe and volunteered assistance in the development of suitable social initiatives and plans in relation to the existing RCM and its expansion which was accepted by the XCQ.

LTGA and many individual submitters raised concerns about the social impacts of the project on the local communities. XCQ responded by describing the potential social impacts and the where the proposed mitigation measures, including the SIMP were detailed in the EIS.

The EIS identified two impacts that would require ongoing monitoring and review. This included:

- traffic impacts on safety and amenity at shift changeover
- labour market impacts on local businesses.

#### **4.18.5 Conclusions and recommendations**

The EIS concluded that the potential social impacts of the project include:

- the possible reduction in housing affordability
- an increase in social divide in the local communities
- road safety
- the increased demand on social infrastructure
- the sourcing of skilled labour.

The EIS also noted that a number of opportunities were raised by the community, such as:

- increased local employment
- incentives for mining families to live in the local towns
- education and training initiatives
- local procurement opportunities for local businesses
- improved community engagement with the mine.

XCQ has contributed to the local community via funding community initiatives and by making a significant financial contribution to a health facility in Rolleston. The EIS noted that several of XCQ's policies provide for the effective management and mitigation of negative social impacts, including its:

- recruitment policy
- fatigue management policy
- employee code of conduct
- CHMP
- Local housing purchase assistance policy

- the provision of additional accommodation facilities at the RCM workers village.

EHP considers that when the mitigation strategies outlined in the SIMP are activated, the only impacts that would require regular and serious monitoring and review are the traffic impacts on safety and amenity at shift changeover and the labour market impacts on local businesses.

## 4.19 Cultural heritage

### 4.19.1 Indigenous cultural heritage

#### 4.19.1.1 Values

A number of Indigenous objects and areas of significance were identified during the EIS; however, their locations remain confidential due to the Indigenous cultural and family values. This EIS stated that the information would be retained by the Traditional Owners and would be used during pre-clearing surveys as outlined in the CHMP. There is an existing CHMP, the Cultural Heritage Management Plan – Rolleston Mine 2003, for ML70307. This plan (and agreement) was amended with the Traditional Owners in 2012.

An additional CHMP, the Rolleston Expansion Cultural Heritage Management Plan 2013, was prepared with the Bidjara People for MLA70415, MLA70416, ML70418 and MLA70458, and approved by DATSIMA on 3 April 2013.

The EIS stated that cultural heritage surveys have commenced consistent with the CHMPs for the project site.

#### 4.19.1.2 Avoidance, mitigation and management measures

The EIS stated that potential impacts of the project would be managed in accordance with the two CHMPs. Both plans have been developed in consultation with the relevant Aboriginal parties and outline the relevant actions to avoid, minimise or mitigate impacts on cultural heritage. Such measures include additional survey and monitoring by the recognised Traditional Owners. These plans would further form the basis for management and would enable impacts on Indigenous heritage to be managed in a suitable and timely manner.

### 4.19.2 Non-Indigenous cultural heritage

#### 4.19.2.1 Values

Searches in the Australian Heritage Database, the Queensland Government's Heritage Register and the CHRC Heritage Overlay revealed no non-Indigenous heritage places within the project site. A search of the EHP's Reported Places Database contained data on two reported heritage places close to the project site: the Tyson's Steam Tractor and the Albinia Yards and Dip.

The EIS identified the potential for historical archaeological sites, such as working and living areas, to exist across the project site given the historic pastoral land use. A review of archival sources has shown three 'hut and yard' areas to occur on MLA70415 and ML70307. Site inspections were subsequently undertaken to confirm the locations. No other evidence or signs of above ground or historical archaeological sites were identified during the course of this work.

#### 4.19.2.2 Impacts

Tyson's Steam Tractor was identified in the 1990s in an area near Meteor Creek, approximately 400m from the southern boundary of MLA70458. The EIS concluded that given the distance from project activities, the project would have no significant impacts on this site and that the risk of a significant impact to this heritage area would be neutral.

The location of the Albinia Yards and Dip is indicated to be 10km from the project site. The site was considered to be of local and state significance and was therefore assigned a high value of sensitivity. However, due to its distance, the EIS concluded that impacts would be unlikely and that the risk of a significant impact to this heritage area would be neutral.

The EIS assessment of impacts on the historic huts and yards identified the potential risk as significant. Although the EIS stated that the sensitivity of the archaeological deposits across the project site would vary on a case by case basis, it concluded that archaeological deposits found would be of local or perhaps state importance and were therefore assigned a moderate sensitivity rating with a low magnitude of change. The risk of a significant impact to archaeological deposits in the hut and yard area was considered to be slight. The EIS further concluded that the yards would have a greater chance to be impacted, particularly within MLA70415, that impacts would be likely major and that the overall risk of a significant impact would be moderate.

#### 4.19.2.3 Avoidance, mitigation and management measures

According to the EIS there would be the chance that material of cultural significance could be present. In the case that archaeological deposits were uncovered during construction, a 'Stop Works' process would be implemented, such as:

- work would cease in the immediate area and the local site would be secured
- the identified material or site would not be removed or disturbed further
- the find would be reported directly by the site supervisor (or other appropriate manager) or through an onsite cultural heritage specialist
- EHP would be informed using the EHP's document titled Reporting a Discovery under the *Queensland Heritage Act 1992*
- EHP would determine the significance and future management of the find.

Furthermore, the EIS outlined that information on non-Indigenous cultural heritage would be incorporated into the general site induction process. This document would be prepared by a qualified heritage specialist and also integrated with the Indigenous cultural heritage inductions developed under the CHMP. Practical mitigation and management measures would be negotiated with EHP and form part of the EM plan for the proposed project.

#### 4.19.3 Outstanding issues

Several similar comments were received relating to cultural heritage issues. A key concern was that the EIS did not mention that discussions and site visits had occurred with Indigenous people to support assessment of the potential impacts of the project on cultural heritage values. The proponent responded to each of the comments, but no amendments were made to the Indigenous and non-Indigenous heritage chapters of the EIS. There were no outstanding issues.

#### 4.19.4 Conclusions and recommendations

The EIS has provided a satisfactory assessment of the potential impacts to Indigenous and non-Indigenous cultural heritage values.

The approved CHMP provides an appropriate framework for managing impacts on Indigenous cultural heritage values.

### 4.20 Landscapes and visual amenity

#### 4.20.1 Existing values

Landscapes and visual amenity was discussed in the Land chapter of the EIS and in the Landscape and Visual Assessment, AECOM 2014, Appendix D-4 of the EIS.

According to the EIS, the project site was described as being dominated by low undulating hilly country formed over weakly dissected volcanic rocks, rising on average to 50m above the alluvial terraces and gently undulating low broad rises fringing Bootes and Meteor creeks. The Black Alley Range, part of Carnarvon National Park which also includes the Consuelo Tableland, is approximately 60km southwest from the project site. The project site is part of the wider Brigalow Belt bioregion.

The project area is predominantly rural, comprising rangelands and small areas of cropping associated with flatter areas. Four grazing/agricultural properties are located in the wider landscape context of the project:

- Meteor Park
- Springwood
- Mount Kelman
- Meteor Downs.

The wider landscape includes some vegetation, particularly associated with higher elevations, state forests and other protected areas. Protected lands in the wider vicinity of the site include:

- Mount Hope State Forest located to the west of the site
- Mount Pleasant State Forest located to the south
- Albinia National Park located to the east between the existing mine site and the Dawson Highway.

The Dawson Highway is the main transport route within the area and lies to the north of the project (1km at its closest point). The Carnarvon Highway is also present but lies some 11km to the south-east. Springwood Road and the access road to the existing RCM, are the only local roads within the project area. There are a number of small unsealed farm tracks leading to nearby farmsteads, such as Springwood.

The EIS described the broad visual context of the landscape surrounding the project site as of open spaces and paddocks (predominantly due to clearing for agricultural purposes) which allow a wide field of view, both horizontally and vertically. Few built elements were noted in this predominantly rural landscape. The mountainous ranges that form part of the Albinia National Park were visible in the distant background from a number of locations.

The existing visual setting in the EIS was described from ten representative viewpoints that surround the project site. These viewpoints corresponded to locations of existing residents, frequently used roads or highways and recreational areas. These were considered representative of the types of views likely to be experienced by receptors around the site, including those locations from where there are the greatest potential visual impacts. Eight representative viewpoints were used to assess potential impacts on visual amenity while two were used to consider project lighting and its potential impact at night.

Three topographic units have been recognised: Undulating to low hilly terrain; prominent low steep-flow scarps; and flat low lying alluvial plains. Four broad landscape character types (LCT) were also identified within the project area:

- LCT A: Rural rangelands and croplands.
- LCT B: Wooded creek valleys.
- LCT C: Wooded hills and tablelands.
- LCT D: Transitional mining areas.

#### **4.20.2 Impacts**

The key transport route through the area is the Dawson Highway, which is the main route to Rolleston from Springsure. Users of Carnarvon National Park are likely to travel on the Dawson Highway. According to the EIS when observing the existing landscape from Dawson Highway, receptor audiences would have minimal or no awareness that there is an existing RCM in close proximity to the highway due to topographical undulations and mature vegetation which lines the roadsides. Side roads which extend off Dawson Highway do however capture different views and existing mining activities become more visible. This is particularly noticeable when travelling along Springwood Road. Various stockpiles and out of pit dumps are visible from Springwood Road and infrastructure, such as dragline excavators, are also visible. It was noted that many of the roads lead to private roads and receive little traffic.

Albinia National Park located to the east of the existing RCM is a relatively new National Park that was established in 2005 on a former cattle property. This National Park shows minimal signs of recreational facilities or activity, with signage the only obvious feature.

There are currently very few residents living in this rural area of Rolleston; however it is apparent that there were more residences than currently exist. Residential numbers have decreased with the construction and expansion of the existing mine through the sale and purchase of these private properties. Residences which do remain have now become more generally affected by mining activities.

The EIS's Landscape Visual Impact Assessment identified that a significant impact is considered likely to occur on landscape character. However, no significant impacts are considered likely to occur on visual amenity. Further, no significant cumulative impacts with other projects identified in the area are considered likely to occur.

The EIS identified a number of project components that could impact on the character and amenity of the surrounding landscape. Project components such as spoil dumps, excavated voids and broad-scale vegetation and land clearing were identified in the EIS as likely to change the broad-scale topography and character of the project site.

The following primary sources of potential landscape and visual impacts were identified:

- construction and operation of haul roads (light and heavy vehicle) and relocation of Springwood Road
- construction and relocation of powerline infrastructure
- installation of security fencing
- construction and operation of supporting buildings
- construction and operation of water management infrastructure, including levees and dams
- removal of vegetation
- removal and storage of topsoil

- removal of overburden and creation of out of pit spoil dumps
- open-cut coal extraction
- ROM stockpiling
- rehabilitation and decommissioning.

According to the EIS ancillary infrastructure required for the project, such as power lines and water pipelines, has largely been constructed for the existing mine. Further ancillary infrastructure would be constructed within existing corridors where possible, reducing additional land disturbance and visual impact.

### **4.20.3 Avoidance, mitigation and management measures**

According to the EIS, the existing RCM EM plan would be updated to manage environmental impacts, such as potential impacts on visual amenity. In particular, the RCM Rehabilitation Management Plan provides specific mitigation and management actions that cover potential impacts on land values and visual amenity.

Proposed mitigation measures identified in the EIS to reduce and manage the impact on landscape character and visual amenity included:

- vegetation would remain *in-situ* as long as possible to prolong the screening effects
- stream diversions would be designed to produce stable watercourses, with reinstated riparian habitat
- immediate use of stripped topsoil for rehabilitation works to maximise use of the stored seed bank
- minimising the height of topsoil stockpiles required to the greatest extent possible
- seeding of topsoil stockpiles using appropriate grass species
- establishment of stable vegetated overburden dumps to screen mine activities, including minimising light spill
- where overburden dumps remain following pit closure, they would, wherever possible, mimic local landforms to the greatest extent possible during establishment to minimise re-work
- where re-work of overburden dumps is unavoidable, rapid stabilisation using seeding of appropriate species would be undertaken
- the number of lights would be minimised to meet operational health and safety requirements
- light spill would be contained to the greatest extent possible (e.g. use of directional lighting)
- the project site would be maintained in good condition, particularly adjacent to neighbouring properties
- restoration would commence as soon as possible following completion of mining activities in an area
- emulating pre-operation landforms to the greatest extent possible using naturally flowing contours that integrate smoothly into undisturbed areas.

### **4.20.4 Outstanding issues**

The EIS received three comments on landscape and visual amenity issues. A key concern was about lighting impacts on neighbouring properties. XCQ responded to the comments made in submissions, updated the lighting assessment on visual amenity and also contacted the parties in question to resolve this issue. No outstanding issues remain.

### **4.20.5 Conclusions and recommendations**

The landscape visual impact assessment identified that a significant impact is considered likely to occur on landscape character. However, no significant impacts are considered likely to occur on visual amenity. Further, no significant cumulative impacts with other projects identified in the area are considered likely to occur.

A number of mitigation measures are intended to reduce the project's effect on landscape character and visual amenity. These measures are likely to be adequate.

The EIS satisfactorily addressed the TOR with respect to the assessment of existing values and impacts on landscape character and visual amenity.

## 4.21 Hazard and risk

### 4.21.1 Existing values

A desktop review was undertaken for the hazard and risk assessment that identified a number of sensitive receptors and their values within the project area. The hazards fell into two categories of receptors—people and property.

People in the vicinity of the project considered in the assessment included:

- residents and workers in surrounding homesteads, nearby townships and the RCM accommodation village
- road users and pedestrians on routes utilised throughout the project construction and operation phases
- mine workers and contractors.

The general types of property considered in the assessment to be most likely at risk included:

- site land, resources and infrastructure
- vehicles and equipment related to RCM operations
- vehicles and equipment not related to RCM operations
- surrounding privately leased or owned agricultural and residential land, land resources and infrastructure
- state forests, national parks, water resources, state roads, recreational areas
- off-site industrial or public infrastructure within the project area, including roads, railways, power and transmission lines, electricity substations, pipelines and other public or privately owned infrastructure
- nearby townships of Rolleston and Springsure.

The EIS provided a risk assessment of the environmental values related to people and property that could be affected by any hazardous materials and or activities associated with the project. The risk assessment assumed that there would be an ongoing hazard and risk assessment process throughout the life of the project, designed to minimise risks to the environment and community.

The potential impacts and risks of natural disasters and emergencies, including upon state and public resources were also considered in the EIS. Consultation with the Rolleston Coal Community Reference Group was carried out during the EIS.

### 4.21.2 Impacts

The EIS identified potential hazards and risks that would be associated with the project, including consideration of long term impacts, fatal hazards, dangerous goods and chemicals, and construction activities. The EIS further stated that many construction tasks, including earthworks and building works, would be similar to those carried out during the normal operation of the existing RCM and hence current management measures would be adopted where appropriate for the project.

#### Preliminary hazard analysis

The EIS's preliminary hazard analysis identified potential impacts for both on-site and off-site project activities during all stages. The TOR requirements were also included in the preliminary hazard analysis, such as:

- all relevant major hazards, both technological and natural
- the possible frequency of potential hazards, accidents, spillages and abnormal events occurring
- indication of cumulative risk levels to surrounding land uses
- life of identified hazards
- description of processes, type of machinery and equipment used
- potential wildlife hazards, such as snakes and disease vectors.

According to the EIS, the preliminary hazard analysis identified 28 different hazards. Each potential hazard was analysed in terms of potential impact and the consequence, likelihood and overall risk of the impact. Then mitigation, prevention and responsive measures were considered to analyse the risk of any residual impact after mitigation. Of the 28 identified hazards, none had a high residual impact after mitigation measures were applied. Hazards assigned a medium residual impact included:

- accidents between mine-related vehicles and private vehicles
- accidents between mine-related vehicles and pedestrians
- major rain/flood event occurring upstream or on-site

- bushfires on the project site
- chlorine leaks or spills from storage
- snake bites
- lightning
- heat events
- sun exposures.

### **Dangerous goods**

The EIS stated that the current operation of the RCM contains procedures for the safe storage, transport and use of dangerous goods. The regulated use of these goods would continue throughout the expansion of operations, subject to changes in quantity and location of use. The EIS outlined an indicative list of hazardous goods to be used during the phases of the project. The EIS also stated that the monitoring of hazardous substance use and storage, through the implementation of the various hazard and risk procedures, would adequately address the potential risk posed by the utilisation of dangerous goods and chemicals. The management of dangerous goods would be conducted according to currently implemented risk protocols and procedures at the existing RCM, as set out in RCM's mine operating system. Furthermore, appropriately trained and certified contractors would be sought to carry out activities requiring specialist experience or operation licences.

### **Natural disasters**

Risks from emergencies, including natural disasters were also described and analysed in the EIS. In particular potential impacts and risks for their consequence and likelihood of impact upon resources, such as:

- forests and water reserves
- State and local government-controlled roads
- places of residence and work
- recreational areas.

According to the EIS, a major risk to the values of these resources was identified as the advent of natural or activity induced floods, bushfires, or landslides.

Refer to section 4.7, Climate and section 4.12, Surface water of this EIS assessment report for further information on the assessment of natural disasters.

### **4.21.3 Avoidance, mitigation and management measures**

The EIS stated that the level and nature of risks associated with the project, as an expansion to the existing RCM operation, are well understood. According to the EIS the project would not present a significant hazard or risk to people or property following the application of suitable and practical mitigation, control and management measures as outlined in existing plans and procedures. Furthermore, the preliminary hazard analysis also found the potential for a serious incident occurring involving dangerous goods is considered unlikely, with an event likely to be contained within the project site. The EIS concluded that the existing RCM's Principal Hazard Management Plans, emergency response action plans, the incident management system and other existing RCM hazard plans and documents would be adapted and updated for the expansion project, following a review of site hazard and risk management procedures to accommodate the expansion of infrastructure and mining activities.

According to the EIS, the RCM's Mine Operating System and Incident Management Manual would be adopted for the project to manage and limit risk levels to as low as reasonably practicable. It was further stated in the EIS that the experience gained through operating the existing RCM, as well as corporate knowledge gained from various XCQ's coal mine operations across Queensland and New South Wales, provides XCQ a broad understanding of industry practice for managing hazard and risk.

### **Mine operating system**

The EIS stated that the project would run under all aspects of the existing RCM's Mine Operating System. XCQ committed to develop and implement an updated integrated risk management procedure, as well as safely managing any risks involved in the change in operations during each phase of construction, operation, decommissioning and rehabilitation of the project.

Additionally, an updated and targeted risk assessment would be carried out in order to identify introduced or increased risks posed by any changes to the project or its operation. These commitments would be included in XCQ's risk and change management standards and ongoing assessment of risks on-site. The EIS stated that auditing of critical controls and mitigation measures would also be put in place to ensure risks are managed appropriately.



## **Incident management manual**

According to the EIS, the existing RCM's Incident Management Manual would be adapted and updated to reflect the proposed changes in operations occurring through the stages of the expansion project. The EIS stated that the RCM's Incident Management Manual provides an appropriate framework for managing an emergency situation or critical on-site incident. It also provides employees with procedures, tools and clear direction to assist them in responding to a critical incident and its associated impacts.

The EIS stated that the RCM's Incident Management Manual applies to all personnel and contractors. All mine workers would be made aware of it during site induction training and toolbox talks. Also, all on-site visitors would be under the direction of a fully inducted coal mine worker, who will be responsible for the visitor(s) at all times, including during an incident or emergency.

## **Incident and emergency response teams**

The EIS stated that incident and emergency response teams that currently oversee the existing RCM activities would continue to serve the project to ensure that adequately trained and equipped personnel would be readily available in the event of an incident or emergency. The teams would consist of volunteers from each operation shift and site areas and are trained in:

- fire fighting
- chemical, diesel and oil spill response and clean up
- first aid
- responding to vehicular accidents.

In addition, the EIS stated that it is and would continue to be a requirement of site attendees, employees and contractors to have undergone a certified coal mining training program, which addresses basic responses to emergency situations, including fire-fighting and first aid responses. Spill response would also be a requirement of all employees, with a procedure nominating the level of response required relevant to the magnitude and nature of the spill.

### **4.21.4 Outstanding issues**

The Queensland Fire and Emergency Services (QFES) reviewed the amended EIS and response to its submission and commented, that while the amended EIS outlined the use of the Mine Operating System, the Incident Management Manual, the Principal Hazard Management Plan and Incident Response Plan, these type of documents are expected on a project of this size and scope. The QFES outlined that it did not receive details of these plans, but as the project is an extension of the existing RCM, QFES acknowledged that the existing plans would be adequate and would be reviewed, as required. However, QFES stated that the EIS outlined that the Mine Operating System, the Incident Management Manual and the Fire Management Guidelines would be updated, but no timeframe were provided. Hence, QFES would expect that the update should be carried out within three months of the project's approval and reviewed annually as required under the Building Fire Safety Regulation 2008.

The QFES also commented that the reference to the Queensland Fire and Rescue Service would need to be changed to the new departmental name, the Queensland Fire and Emergency Services.

The Queensland Ambulance Service (QAS) also commented on the amended EIS. QAS stated that Xcq should commit to providing QAS with a copy of the key contact list and the emergency response plan, as it requires these documents in the event of an emergency or extraordinary event.

### **4.21.5 Conclusions and recommendations**

The EIS provided a satisfactory response to the TOR with respect to hazards and risks. However, the operating Mine Operating System, the Incident Management Manual and the Fire Management Guidelines would need to be updated within three months of the project's approval and reviewed annually as required under the Building Fire Safety Regulation 2008. Furthermore, all operational documents should also be updated to reflect the correct departmental names.

Xcq should also provide QAS with a copy of the key contact list and the emergency response plan within three months of the project's approval.

## 4.22 Health and safety

### 4.22.1 Existing values

The EIS identified potential health and safety impacts to existing community values. The majority of information was derived from existing standards and policies from XCC and the existing RCM operation, from technical assessments, desktop studies and reviews of relevant legislation codes and policies, and stakeholder consultation.

The existing environment in the vicinity of the project includes the following major receptors:

- the township of Rolleston located 16km east of the project boundary
- the township of Springsure located 58km north-west of the project site
- rural residences spread throughout the region
- rural industries such as cropping, grazing
- the RCM accommodation camps, located on the existing lease and on MLA70415
- health, safety and emergency services.

The townships are located on the Dawson Highway which is part of the road network currently used for moving goods and workers to and from the existing Rolleston coal mine.

Workers accommodated at the villages are either BIBO, FIFO or DIDO workers.

The creeks that cross or are adjacent to the project site are Bootes, Meteor and Sandy Creeks. Downstream extractors and water licence holders are dependent upon the quality of the water in this Comet River sub-basin.

### 4.22.2 Impacts

The EIS assessment considered:

- impacts on the community in terms of health, safety, and quality of life
- short and long term impacts on public health
- contamination and public health risk
- disease vectors.

These potential impacts were assessed with regard to the existing values and receptors identified for the construction, operation and decommissioning phases of the project. The EIS did not consider issues of occupational health and safety, except when a mine worker's activity may impact upon community values or public health and safety, such as driver fatigue or road use issues. The EIS identified the following key potential impacts:

- dust and air emissions
- odour
- noise and vibration
- road use and safety
- contaminant release
- disease vectors
- natural hazards and emergencies
- cumulative impacts.

### 4.22.3 Avoidance, mitigation and management measures

#### Dust, air emissions and odour

Air quality, including dust, air emissions, odour and the expansion project's contribution to deposited dust at sensitive receivers were discussed in the EIS. A detailed assessment of the potential impacts on air quality, and proposed avoidance, mitigation and management measures is contained in section 4.8 of this EIS assessment report.

According to the EIS the proposed dust mitigation measures that will be put in place (as discussed in section 4.8), and the distance and isolation of the mining activities from sensitive receptor locations, would reduce the risk of significant impacts from dust particulates on identified sensitive receptor locations, in particular private water sources. The EIS also stated that the modelled dust deposition levels are predicted to be 50% below the recommended  $120\mu\text{g}/\text{m}^2/\text{day}$ . Consequently, the EIS concluded that provided suitable dust mitigation measures

are in place and effective, there would likely be no significant health and safety impacts associated with coal mining activities to contaminate private water sources by settling on surfaces that collect water for rainwater tanks.

The EIS identified two main sources of potential odour nuisances, namely the sewerage treatment plant and the storage of waste onsite in bins and transfer stations. The EIS proposed several mitigation measures such as the covering the waste, to minimise the risk of generating odour and attracting vermin to waste stores, and appropriate design of the on-site sewerage treatment plant.

### **Noise and vibration**

The EIS discussed the expansion project's contribution to noise and vibration at sensitive receptor locations. A detailed assessment of the potential impacts on noise and vibration, and proposed avoidance, mitigation and management measures is contained in section 4.16 of this EIS assessment report.

The EIS stated that the potential noise and vibration impacts on identified sensitive receptors would comply with noise criteria and EA conditions. Mitigation measures outlined in the EIS, included:

- training of employees in community obligations
- using mining equipment that would comply within noise criteria
- explosive blasts required for the mining activity would achieve the nominated criteria
- complaints would be recorded in the site complaints/incidents register.

### **Road use and safety**

The EIS discussed road use and safety impacts upon existing transport infrastructure. A detailed assessment of the potential road use and safety impacts, and proposed avoidance, mitigation and management measures is contained in section 4.15 of this EIS assessment report.

According to the EIS a RUMP that would suitably manage road related impacts would be implemented for the construction and operational phases of the project. The RUMP developed in consultation with DTMR and CHRC would enable Xcq to effectively manage current and future increases in district road use and access. The RUMP would be designed to manage specific freight commodities and specific types of heavy vehicles to manage adverse traffic management risks and road impacts. The RUMP would also identify appropriate traffic and transport management strategies. The strategies would be implemented for state-controlled and, if necessary, local government roads to minimise potential impact on the road networks, as well as the network's operational safety.

### **Contaminant release**

The mitigation measures outlined in the EIS for the management of dangerous goods and waste included:

- storage of potential contaminants in accordance with relevant Australian standards and regulations
- utilising guiding policies and systems noted in the standards to minimise the risk of exposure to any sensitive receptors.

As outlined in section 4.21 of this EIS assessment report, the management of dangerous goods would be conducted according to currently implemented risk protocols and procedures at the existing RCM, as set out in RCM's Mine Operating System. Furthermore, appropriately trained and certified contractors would carry out activities requiring specialist experience or operation licences. In order to mitigate the risk of health and safety effects, the following strategies would be adopted:

- safety data sheets for all dangerous goods used or stored on the project site would be maintained in a register accessible to project personnel
- appropriate controls would be established during the updating of the existing operations risk register, describing the safe use of each item in the inventory
- storage facilities housing dangerous goods or waste would be constructed and operated according to AS1940–2004 for flammable and combustible liquids such as fuels, or other specific standards for other dangerous goods or wastes
- waste streams, including waste lubricating oil, would be stored in a bulk tank or bins for disposal through a suitably licenced waste contractor. The contractor's health and safety management plan would be adequately revised and would require approval from the appropriate site supervisor to meet Xcq's site requirements as a minimum
- a water management strategy to mitigate potential impacts on hydrology, flooding and water quality for the existing RCM and proposed mine expansion. This would include strategies to manage surface water and additional infrastructure, such as levees, dams, diversions and drains (refer to section 4.12 of this assessment report for more information)

- wastewater and effluent from the accommodation and mine infrastructure would be treated by the on-site sewerage treatment plant and reused for dust suppression.

The EIS concluded that with the proposed controls and mitigation strategies in place, the residual impact on health and safety values from dangerous goods storage and use would be low.

### **Receiving water bodies**

The following sources and contaminants were identified in the EIS:

- overburden dumps and coal stockpiles, including incomplete rehabilitation areas: run-off containing suspended solids, dissolved contaminants
- mining areas and voids: suspended solids and dissolved salts
- infrastructure: hydrocarbons, detergents, solvents, suspended solids
- sewage treatment systems: bacteria and nutrients.

The EIS concluded that there would not be any adverse health and safety impacts on the receiving environment with the mitigation measures in place, such as regular monitoring of water quality objectives and the implementation of water management systems and plans.

### **Disease vectors and pests**

The EIS stated that pests and disease vectors could pose a risk to the health and safety of mine workers and the surrounding community if not managed appropriately. Disease vectors would be mitigated primarily through the effective design and implementation of water management infrastructure and procedures, including adherence to the RCM Occupational Health Management Plan. Furthermore, the EIS also outlined that ponding would be prevented through pumped circulation between dams and the dynamic nature of the water management system. The identification of bacteria growth or insect breeding, as well as other disease vectors would be investigated by site environmental staff in accordance with directives from relevant authorities and legislative requirements.

### **Natural hazards and emergencies**

The EIS concluded that extreme meteorological events, flood, or failure of storages can potentially affect the environmental values and that the risk of these events occurring would be adequately mitigated through the detailed design of the infrastructure to meet requirements held in relevant standards and guidelines. This would include the development of a strategy to notify relevant stakeholders in the event of natural hazards and emergencies and an Emergency Contact Register in place to notify relevant stakeholders in the event of an extreme meteorological event, flood or catastrophic failure. The requirement to review, develop and implement an updated Integrated Risk Management Plan, including an Emergency Response Plan, was described in more detail in the EIS Hazard and Risk chapter.

### **Cumulative impacts**

Cumulative impacts were considered in the EIS and included known and planned developments within 50km of the project site. The EIS concluded that emergency service availability would be subject to demand posed by existing or planned developments in the general vicinity of the project. The proposed Meteor Downs South Project would be located adjacent to the northern boundary of this project. The EIS also concluded that cumulative impacts potentially affecting public health and safety would be addressed through consultation with the relevant emergency services and the wider community.

#### **4.22.4 Outstanding issues**

Several comments were received on the Health and Safety Chapter of the EIS. Key comments included consultation when working within close proximity of Ergon Energy infrastructure; consultation with QFES on special fire service installations within the accommodation villages to ensure acceptability and compatibility of these installations with QFES resources and equipment; and the potential to compromise the health of affected communities. XCQ responded to each of the comments made and no outstanding issues were identified following the response.

#### **4.22.5 Conclusions and recommendations**

The EIS has provided a satisfactory response to the submissions made on the health and safety chapter and the TOR was also adequately addressed.

## 4.23 Rehabilitation and decommissioning

### 4.23.1 Approach

According to the EIS, XCQ has established processes that would systematically progress and plan for mine closure. The processes consider economic, social and environmental factors over the life of mine and aim to achieve long term sustainable outcomes for the land. Site specific plans and procedures based on this process have been developed and implemented at the existing RCM and would be applied to the expansion project. The EIS provided an overview of existing rehabilitation practices at the existing RCM and its application to the project.

A Rehabilitation Management Plan (RMP) in use for the existing RCM operation accords with the current EA. The goals of the RMP and the objectives of rehabilitation are to ensure that at the time of relinquishment of the mining lease:

- landform stability is established and non-polluting
- sustainable ecosystems are re-established
- water quality is maintained
- landforms do not pose a risk to public and animal safety and

are able to sustain the agreed post-mining land use.

These goals have been applied to the existing RCM mine and have guided the development of site specific plans. These goals are also seen to enable long-term maintenance of essential ecological processes for the site.

According to the EIS, the existing mine had 395ha of land under rehabilitation as of November 2013. The EIS noted that the active rehabilitation program requires all disturbed areas larger than five hectares to be progressively rehabilitated within 18 months of the completion of mining. XCQ committed in the EIS to continue this approach to rehabilitation for the expansion project. The EIS stated that works would be progressive and staged, minimising the period of disturbance and the potential for harm to the environment. XCQ committed in the EIS that the conceptual mine closure plan (CMCP), RMP and EM plan would be updated to ensure compliance with the project's EA and commitments in the EIS.

The EIS developed broad rehabilitation objectives for the project. Upon amendment of the EA, these values would be refined and developed into more detailed, measurable criteria. These criteria would define the standard for management and the outcomes for rehabilitation within the project area. Amendment of the RMP and CMCP would also be required to include the revised criteria. The nominated post-mine land use defines the goals and objectives for rehabilitation as well as indicators and completion criteria used as a benchmark for determining success. Over most of the site, XCQ's efforts would be primarily directed towards reinstatement of the previous land use, i.e. low intensity cattle grazing and any infrastructure consistent with the nominated post mining land use, such as roads and water storages. These uses are considered to be consistent with prior land use. At the same time, it is recognised that for some areas such as the final voids it would only be feasible to achieve a land use of lower value.

The EIS stated that mine closure would be planned and undertaken in accordance with XCQ's CMCP for the existing RCM. XCQ has committed in the EIS to developing a detailed mine closure plan in accordance with the EA five years prior to closure. XCQ has committed to remove infrastructure from the project area prior to ML surrender, except where a beneficial re-use is agreed by the landholder and or administrating authority. The EIS stated that where mine infrastructure components are unable to be sold or re-used, they would be recycled or disposed of, any contaminated areas would be excavated and material suitably disposed of, and final landforms reshaped and rehabilitated. The mine closure plan would be required to ensure that the project site is safe and stable, and compliant with conditions of the EA. Specific detailed requirements for rehabilitation associated with the retention or removal of infrastructure would be confirmed towards the end of the mine life and in consultation with all relevant stakeholders.

### 4.23.2 Impacts

XCQ has committed to progressive rehabilitation of the mine site as areas become available. This would minimise the overall extent of disturbance at any point in time. Identified objectives include:

- minimising erosion and downstream sedimentation
- reduce dust
- increase nutrient cycling
- limit colonisation of weeds
- reducing the ecological impacts of clearing by re-establishing base level biodiversity

- restored visual amenity.

The EIS identified increased sedimentation of creeks due to erosion and sedimentation a potential impact to be managed. The EIS identified those rehabilitation and decommissioning activities that, if not suitably managed, would generate impacts:

- land disturbance
- placement and stockpiling of topsoil
- overburden
- final voids
- ripping and surface preparation
- revegetation.

#### 4.23.3 Mitigation and management measures

Rehabilitation of disturbed areas would initially involve surface contouring to resemble the original local topography, with spoil dumps shaped to resemble the surrounding undulating low hilly terrain, and to minimise erosion and maximise water retention. Ripping of the surface and topsoil spreading are then to occur, i.e. prior to the establishment of vegetation. Areas to be rehabilitated are to be seeded with appropriate plant species to achieve the proposed post-mining land use. Initially, introduced pasture and native grass species would be sown. Over time nitrogen would be bound up in the litter and grass roots and the grass component would subside. At this time, the suitability over-sowing with native tree and shrub seeds would be considered. Plant species selection, vegetation density and diversity would be determined by the pre-mining ecosystems and post-mining land use.

The EIS stated that success of vegetation trials and the results of on-going monitoring would determine plant species selection and rehabilitation techniques to be applied post-mining land use.

Mitigation and management measures described in the EIS included:

- Land disturbance – a detailed vegetation clearing protocol under a self-assessable 'Permit to Disturb' would be implemented and would consider: minimisation and staging of disturbance, topsoil stripping and placement, rehabilitation, the plan of operations, biodiversity and cultural values, erosion and sediment control, weed management, water quality, visual amenity (including rock dump height), and community values.
- Topsoil would be managed via amended versions of the RMP, WMP, EM plan and the associated Biodiversity and Land Management sub-plan. Topsoil stripping would be subject to appropriate erosion and sedimentation controls in the RMP and the WMP. Areas stripped would be surveyed and documented in the Mine Disturbance Plan as part of the project's Plan of Operations. The topsoil stockpile height would be minimised to less than four metres in height and monitored for weed infestations.
- Overburden formed into slopes or rehabilitation areas would be sampled and analysed to determine its suitability as a vegetation sub-soil growth medium. The EIS identified some overburden material would be strongly sodic and so gypsum would be used to ameliorate the sodic material. Emplacement slopes would be contoured and or benched to reduce slope length and drain to stable receiving areas where potential erosion would be appropriately managed.
- Final landforms would be designed to reduce the number and volume of residual voids and to minimise rock dump height. Final voids are predicted to initially fill rapidly and reach a stable water level in 100 to 150 years post mining. The EIS stated that modelling indicated that no overflows from voids are predicted and concluded that voids would not interact with surface water. Furthermore, salt concentration would increase over time but are predicted to be below the adverse effect salinity limit (i.e. 4000mg/L) for beef cattle stock water in accordance with Australian and New Zealand Guidelines for Fresh and Marine Water Quality (ANZECC, 2000). The EIS also stated that final void low wall gradients (between 29° and 45°) would be designed to provide potential safe access to animals and humans. However, it also stated that the height between the pit rim and predicted water level in the voids will not be easily accessible from the surface level indicating that the final voids may not be safe for human and animal interaction particularly from the void high wall that would likely have a gradient of between 45° and 75° subject to the final requirements of the EA and RMP. Final voids would be inspected by a geotechnical engineer to determine geotechnical stability at mine closure. The EIS did not make a similar commitment for a final water quality report for voids at mine closure.
- Ripping and surface preparation - Revegetation would conform to the existing protocols to establish a dense surface cover of vegetation in the short term to reduce erosion and sedimentation; and in the long term provide vegetation density and diversity in accordance with the final nominated land use. Vegetation species for use were tabled and weed control protocols would be managed through a Pest Management Plan.

Monitoring undertaken as part of the project would be analysed over the longer term and used to determine whether rehabilitation is developing along a trajectory toward success in terms of the development of desired plant communities, landform and land use. Corrective action would be undertaken to improve the standard of work if the nominated performance criteria were not achieved.

- The existing erosion and sedimentation control measures as per the EM plan, RMP and WMP would be updated and implemented for the expansion project.
- The EIS outlined specific strategies to manage erosion and sedimentation impacts. It stated that disturbed areas undergoing rehabilitation are susceptible to erosion from rainfall and overland flow, particularly prior to vegetation establishment. The EIS noted that sediment-laden runoff from rehabilitation areas could impact on water quality both on-lease and off-lease (e.g. increased turbidity). Proposed actions to manage erosion and sediment on the mine site included:
  - clean water diversion banks would be constructed on and around overburden emplacements to divert clean water away from waste areas. Measures to minimise erosion and subsequent sedimentation of waterways would be installed prior to reshaping the landforms to be revegetated (e.g. sediment dams and rock armouring)
  - surface water runoff from rehabilitated and disturbed areas would pass through sediment control structures (e.g. sediment dams) as part of the overall mine site water management system to minimise impact to the receiving environment
  - monitoring of the existing RCM overburden rehabilitation suggests that the use of hay mulch at a rate of approximately 20 large round bales per hectare at seeding time provides sufficient surface cover to minimise erosion during the first months of the wet season. This approach would be used on the project site. As vegetation establishes, the quality of surface water runoff from rehabilitated landforms would likely improve, meeting the completion criteria for discharge off-site
  - the existing RCM erosion and sediment control procedures (i.e. captured in the EM plan, RMP and Water Management Plan) would be reviewed, updated and implemented accordingly for the expansion project
  - monitoring of water captured in impoundments as well as the rehabilitation would determine whether water quality, erosion and sedimentation control and revegetation targets are being achieved.

The EIS stated that the creek diversions would be used to divert clean water around the active mine areas and would reduce the potential for and volume of mine affected water. The creek diversions would be designed and constructed in accordance with EA licence conditions to achieve the outcomes in the DNRM guideline.

According to the EIS, annual monitoring of rehabilitated mined land at the existing RCM has been undertaken since 2010. Eighteen monitoring sites have been established with eight reference sites, including one within Albinia National Park (but outside of the riparian area of Meteor Creek). Annual reporting and monitoring would continue for the expansion project. The EIS noted that additional reference sites would be required to replace any that are impacted by the expansion or that may be required to adequately meet the values of an area that would be cleared. The draft EM plan and proposed EA listed rehabilitation performance criteria provided for each nominated land use (grazing, infrastructure, residual voids, dams, creek diversions and vegetation). Monitoring is expected to occur up to at least Year 30 of production depending on site condition and rehabilitation standards. Corrective actions would be undertaken when monitoring and analysis shows that rehabilitation objectives are not being met.

The EIS noted that a trial for the re-establishment of a 10 hectare area of an EPBC Act listed endangered Semi-evergreen vine thicket had commenced in accordance with the current EA and is actively being monitored via two undisturbed reference sites.

#### **4.23.4 Outstanding issues**

The EIS stated that actions to avoid or minimise fragmentation of habitat were described and that actions include revegetation of Meteor Creek. However no detailed reference to revegetation of Meteor Creek or re-establishing riparian connectivity was provided in the amended EIS. The EIS did acknowledge the localised effects of habitat fragmentation and connectivity on ML70415, and the potential offset land on Meteor Downs and existing vegetation outside the project area to provide connectivity between Albinia National Park and Mount Hope State Forest.

#### **4.23.5 Conclusions and recommendations**

The EIS provided an adequate response to the TOR rehabilitation and decommissioning for the current stage of project design.

Rehabilitation and decommissioning works are proposed to be undertaken early and in a progressive manner. The objective is to return the overall landscape to a similar pre mining landform however the acceptance criteria are not well established in the EIS. Assessment standards for rehabilitation and decommissioning works would be updated

based on those already developed for the existing RCM.

No completion criteria were detailed for the project site in accordance with the current Rehabilitation requirements for mining projects guideline (EHP, 2014). EHP notes that an outdated rehabilitation guideline (DERM, 2011) was referenced in the EIS.

XCQ should commit to completing rehabilitation works in line with current completion criteria where appropriate such as in proximity to Meteor and Sandy Creeks in order to reduce habitat fragmentation from mining activities and to restore connectivity. The aim of the nominated post-mine land use in these riparian and floodplain areas would align with XCQ's stated objective to reinstate a natural ecosystem as similar as possible to the original ecosystem. This would require a trial for the re-establishment of riparian/floodplain vegetation communities. Monitoring of additional reference sites within an undisturbed upstream reach of a riparian section of Meteor Creek is recommended. The reference sites should be within a dominant Weeping Myall Woodlands threatened ecological community (TEC), which may also be in association with a Coolibah-Black Box Woodlands TEC.

A water quality report should also be undertaken by a suitably qualified and experienced person to determine the water quality of all final void standing waters at mine closure. There should be no degradation of surface or ground waters leaving the lease with water quality maintained at a level acceptable for downstream environmental values. This report must be submitted to EHP and would be used to determine compliance with relevant water quality conditions of the amended EA, the proposed beneficial use of the water for cattle stock water, and whether further action would be required to ensure the biological integrity of an aquatic ecosystem impacted by contaminated waters as per the Environmental Protection (Water) Policy 2009.

Recommended rehabilitation and decommissioning EA conditions have been provided in Appendix A of this assessment report.

## 5 Matters of national environmental significance

### 5.1 Introduction

This section and Appendix B of the report addresses the requirements of the Queensland Government's assessment as specified by Schedule 1 of the bilateral agreement between the Australian Government and the Queensland Government relating to environmental assessment, section 59 of the *Environmental Protection Act 1994* (EP Act) and section 9 of the Environmental Protection Regulation 2008 (EP Regulation).

Chapter 21 of the Rolleston Coal Expansion Project Environmental Impact Statement (EIS), and Appendices Q-1 Flora MNES significant impact assessments and Q-2 Fauna MNES significant impact assessments, provided an evaluation of the potential impacts of the project on Matters of National Environmental Significance (MNES) determined by the Australian Government to be controlling provisions under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

In addition, chapters 9 and 10 of the EIS, together with appendices G and H provided an assessment of potential impacts on surface waters and groundwater that addresses matters relevant to the water trigger controlling provision under the EPBC Act.

### 5.2 Controlling provisions

On 13 May 2011, Glencore Coal Queensland Pty Ltd (the proponent, formally Xstrata Coal Queensland Pty Ltd (XCQ)) referred the Rolleston Coal Expansion Project (the project) to the then Department of Sustainability, Environment, Water, Population and Communities (SEWPAC), now Department of the Environment (DOE) for a determination as to whether the project would constitute a controlled action with respect to potential impacts on MNES under the EPBC Act (Referral No. 2011/5965).

On 21 June 2011, the delegate of the Australian Government Environment Minister determined the project to be a controlled action pursuant to section 75 of the EPBC Act. The relevant controlling provisions for the project were determined as being:

- world heritage properties (sections 12 and 15A)
- national heritage places (sections 15B and 15C)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A)
- Great Barrier Reef Marine Park (sections 24B and 24C).



On 22 August 2011, a variation to the referral was made to include the Springwood Mining Lease Application area (MLA70458). This additional area provided for the diversion of Sandy Creek into Meteor Creek and other associated water management infrastructure. On 4 November 2011, the delegate of the Australian Government Environment Minister accepted the variation to the proposal in accordance with section 156B of the EPBC Act.

On 2 September 2013, another variation to the referral was made to include an area of 408.9 hectares (ha) between the existing Rolleston Coal Mine and the proposed expansion. On 12 November 2013, the delegate of the Australian Government Environment Minister accepted the variation to the proposal in accordance with section 156B of the EPBC Act.

### **5.2.1 Water trigger**

Coal seam gas and large coal mining developments with the potential to have a significant impact on water resources require referral to and approval from the Commonwealth Minister for the Environment under the EPBC Act.

On 17 October 2013, the Commonwealth Minister for the Environment notified XCQ that the potential for a significant impact on a water resource in relation to coal seam gas development and large coal mining development (sections 24D and 24E), was an additional controlling provision for the project. The proposed action must be approved for the purposes of this controlling provision before it can proceed.

## **5.3 Assessment process**

The project was assessed under Part 1 of Chapter 3 of the EP Act and the EP Regulation, in accordance with the bilateral agreement for environmental impact assessment between the Australian Government and the Queensland Government (the bilateral agreement). The controlled action will be considered for approval under section 133 of the EPBC Act once the Australian Government Environment Minister has received this EIS assessment report from the delegate under the EP Act.

Potential impacts on MNES have been assessed throughout the EIS process for the project and addressed specifically as a consolidated report in section 5 and Appendix B of this EIS assessment report. The evaluation of potential impacts on MNES presented in this report is based on information contained in the EIS and supplementary information provided. In accordance with the Assessment Bilateral Agreement, DOE was consulted on the adequacy of information, throughout the EIS process and during the preparation of this report.

The Australian Government has established an Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (IESC). The IESC provides scientific advice to decision-makers on the impact that coal seam gas and large coal mining development may have on Australia's water resources. The Commonwealth Minister for the Environment must obtain advice from the IESC and would consider the IESC's advice in making a decision on whether or not to approve the project under the EPBC Act. In accordance with the National Partnership Agreement between Queensland and the Commonwealth in relationship to the EPBC Act water trigger, where projects are assessed under the bilateral agreement the State is to seek advice from the IESC.

The EIS was referred to the IESC on 9 May 2014 for advice. The IESC's advice to EHP and DOE was dated 13 June 2014. It was forwarded to XCQ on 13 June 2014.

## **5.4 Description of the proposed action**

The Rolleston Coal Expansion project would expand the mining area of the existing Rolleston Coal Mine by adding a western and southern mining lease (mining lease applications MLA70415 and MLA70416 respectively). MLA70458 would also form part of the project area for the primary purpose of constructing a water irrigation dam and a creek diversion between Meteor Creek and Sandy Creek and containing the flood afflux from the Meteor Creek flood levee. The increase in mining area provided by the project would increase the mines production tonnage by 5Mt/yr ROM to 19Mt/yr ROM coal, with approximately 280Mt ROM coal over the life of the project of 23 years.

A Marion 8750 dragline and P&H4100 XPC electric rope shovel, with additional support equipment, would operate within MLA70415 and MLA70416. The project would allow for extension of mining within areas of the existing ML70307 (which consists of extensions of Meteor South (A) Pit, Meteor South (B) Pit, Gibbs Gully Pit and W1 Pit, and the establishment of mining within MLA70415 (which consists of W2 Pit, W3 Pit, W4 Pit and extension of Gibbs Gully Pit, and MLA70416 (which consists of extensions to Meteor South (A) and Meteor South (B) Pits. Figure 1 shows the proposed mine site and proposed project area. The project would largely utilise existing infrastructure that is part of the current Rolleston Coal Mine operations, but would require the following additional infrastructure or upgrades: 2-bay heavy vehicle workshop extension, fuel and lube facility upgrade, office expansion, coal handling facility upgrade, train load out facility upgrade, explosives and ammonium nitrate storage, and ROM coal

stockpiles.

A new mine service area would be constructed on MLA70415 to provide minor maintenance services for mining operations and consist of: a two bay workshop, a hardstand area, a 12 person office and meal facility, fuel and lubrication storage, light vehicle and heavy vehicle refuelling/parking, vehicle set down area, services (e.g. water, power, communications and sewage).

The project would also require the development of new haul roads through MLA70415 and MLA70416, a mine service area access road through MLA70415, and a blast compound for western pits in MLA70415.

Several levees, dams, creek diversions and drainage re-alignments would be required to support mining operations, and provide protection from potential environmental impacts downstream on water resources.

Mining would be open cut with mining strips generally 50 to 70m wide, depending on depth and other constraints.

Modelling presented in the EIS indicated that groundwater levels within the saturated alluvial aquifer would decrease through drainage of groundwater through connected alluvial areas to the pits created through mining operations. The EIS noted that this potential loss of shallow alluvial groundwater would be limited to alluvium directly connected to the pits and its general occurrence was limited to the Meteor Creek alluvium. The up and downstream extent of alluvial drainage was limited by the Consuela anticline and a basalt barrier respectively. Within the immediately affected middle reaches of Meteor Creek there would be a total permanent loss of groundwater base flow. Downstream of the sandstone barrier there would be a significant, approximately 52%, reduction in annual base flow including the reaches of Meteor Creek within Albinia National Park. The EIS noted that Meteor Creek was an ephemeral stream and that the average number of no flow days, including in the national park would increase by 57 from 74 days to 131 days per year. The impact to base flow is expected to be permanent as the final voids would continue to be groundwater sinks even post equilibrium (greater than 150 years post mining).

The EIS stated that no other watercourses are expected to lose groundwater base flow as they are not directly connected through the alluvium to the mine pits and final voids.

According to the EIS, permanent groundwater depressurisation of the fractured basalt aquifer is likely to extend over an area of approximately 43,000ha, including significant areas (over 3000ha) of Albinia National Park. Within that basalt aquifer the model indicated reduction in groundwater potentiometric surfaces in the order of 1 to 5 metre outside the mining lease, and greater levels within the mining lease.

The EIS stated that an effectively homogenous fresh basalt layer confined the aquifer at depths of generally over 20m below ground level and that available bore hole data confirmed that rock and regolith above that layer were unsaturated. The EIS asserted that there was little or no likelihood of a connection between the alluvium and the deep basalt aquifer.

## **5.5 Places affected by the proposed action**

The proposed action site is located approximately 275km west of Gladstone; approximately 16km west of Rolleston and 58km south east of Springsure. The project site is approximately 12,758ha in area, but mining with direct impacts would be constrained to an area of 5649ha. Figure 2 in this EIS assessment report provides an overview of the project site and footprint.

The EIS considered the potential for the proposed action to impact on the values of the Great Barrier Reef World Heritage Area (GBRWHA), Great Barrier Reef National Heritage Place (GBRNHP) and Great Barrier Reef Marine Park (GBRMP).

The project site is within the catchment of the Comet River which flows north and joins the Nogoia River to form the Mackenzie River, east of Emerald. The Mackenzie River joins the Dawson River to become the Fitzroy River approximately 85km south-west of Rockhampton. The mouth of the Fitzroy River marks the beginning of the GBRMP and GBRWHA and is approximately 675km downstream of the project area.

Indirect impacts on places outside the project site may occur as a result of groundwater depressurisation, altered stream flows and water quality. Affected places include downstream reaches of Bootes, Meteor and Albinia creeks as well as Albinia National Park.

## **5.6 Assessment method**

A combination of desktop research and field surveys, including targeted surveys, were completed to assess the biodiversity values within the project area. Risk assessments were applied to the significant impact criteria for the remaining controlling provisions of world heritage properties, national heritage properties and Great Barrier Reef Marine Park and facilitated impacts were also considered.

A desktop assessment was undertaken to identify the existing biodiversity values of the project area, by consulting available databases (including the Australian Government's Species Profile and Threats Database (SPRAT)), government publications, published literature and previous unpublished field studies. Database searches included a 20km buffer from the centre of the project area.

The extent of threatened ecological communities (TECs) and threatened species habitat within the project area was estimated based on verified regional ecosystem (RE) mapping for the project area, the structural and floristic attributes of these regional ecosystems, and key criteria and condition thresholds.

The flora, vegetation community and fauna survey work included:

- searches of information sources that included: SPRAT, EHP wildlife online databases, ESAs EHP mapping, Queensland Herbarium Records, National list of Weeds of National Significance, Rolleston Coal Mine EIS, Baseline Terrestrial Biodiversity Assessment for Rolleston Coal Mine, EHP Queensland Wetland Data and National Atlas of Groundwater Dependent Ecosystems, Regional ecosystem mapping, BPA mapping, Essential habitat mapping, and Review of Fitzroy NRM region Back on Track Actions for Biodiversity Plan.
- flora field surveys undertaken over three periods:
  - baseline flora and vegetation community surveys pre-wet season 7–11 of November 2011; post-wet season 16-18 March 2013; and post-wet season 11–13 April 2012 and 17 April 2012. The baseline flora survey in 2011 was primarily focused on verifying regional ecosystem mapping and developing a comprehensive flora list for the project area. Seventy nine quaternary and 32 secondary or tertiary sites were surveyed in accordance with Queensland Herbarium survey methodology (Neldner *et al.* 2005) and were used to support preliminary revised RE mapping at a scale of 1:10,000
  - flora and vegetation community pre-wet season survey 4-11 November 2012 and post-wet season survey 13-16 March 2013. These included six secondary or tertiary sites, 31 quaternary sites, and six biocondition sites to increase replication and improve survey density in regional ecosystems within the project footprint. Random meander searches were also conducted for threatened flora species potentially occurring within the project area
  - a winter vegetation survey were undertaken along Sandy, Meteor and Bootes Creeks in July 2013. This survey included 14 quaternary sites and verified regional ecosystem mapping along Sandy, Meteor and Bootes Creeks, which were not accessible on previous surveys
- fauna surveys were stratified into seven broad habitat types based on vegetation structure, dominant species, and geology and landform. Fauna surveys were undertaken between November 2011 and December 2012. Two wet season surveys with detailed trapping sites were undertaken. One between the 19 and 25 November 2011 and another between the 5 and 11 December 2012. Supplementary bird surveys and spotlighting were undertaken between the 16 and 18 March 2012, and dry season bird surveys were undertaken between the 27 and 31 July 2012. Additional habitat assessments were undertaken in July 2013
- targeted searches for particular threatened species were undertaken in 2011 using Elliot traps, Mawbey PVC traps, wire cage traps, hair tubes, funnel traps with drift fences, pitfall traps, acoustic bat detectors, camera traps, spotlighting, nocturnal active search, call playback, bird surveys and diurnal active searches

In accordance with the Assessment Bilateral Agreement, DOE was consulted on the adequacy of information throughout the EIS process and during the preparation of this report.

EHP notes that surveys were not undertaken of adjacent areas potentially affected by changed surface flows, water quality or groundwater depressurisation.

## 5.7 Mitigation measures

### 5.7.1 Threatened ecological community and threatened species habitat

Construction and operation of the proposed action would impact on TECs, threatened flora and threatened fauna. A combination of practices was proposed that would aim to avoid, minimise, mitigate or compensate for impacts on these values. As an extension of an operational mine, the project would incorporate a number of existing practises that were stated to be effective for the current Rolleston Coal Mine. Additional actions were also proposed where aspects of the environment or impacts differed from those of the existing mine.

**Table 8** summarises the general measures proposed by XCQ to avoid or mitigate impacts to MNES.

**Table 8 MNES potential impacts and mitigation measures (Source: EIS Chapter 21)**

Potential impacts	Mitigation measures
Clearing and fragmentation, edge effects (loss of habitat, loss of connectivity)	<ul style="list-style-type: none"> <li>• minimisation of the disturbance footprint through construction and operational design</li> <li>• employment of suitably qualified and experienced environmental staff during construction, operation and decommissioning</li> <li>• internal regulation of vegetation clearing through disturbance of vegetation permits</li> <li>• delineation of clearing areas with flagging tape, pegs or similar to clearly identify boundaries of permitted disturbance area</li> <li>• staged vegetation clearing to limit area and duration of bare ground exposure</li> <li>• control measures to minimise erosion and sediment transfer</li> <li>• provision of offsets</li> </ul>
Degradation of terrestrial habitat – changes in hydrology, connectivity, soil structure and nutrient status, air quality, species composition (through burning or weed/pest invasion)	<ul style="list-style-type: none"> <li>• collection of native plant seed, rocks and logs prior to disturbance for later rehabilitation usage</li> <li>• suppression of dust generation by haul road watering</li> <li>• exotic plant control strategies including <ul style="list-style-type: none"> <li>○ physical and chemical control treatments</li> <li>○ elective topsoil stripping/stockpiling</li> <li>○ vehicle wash down</li> </ul> </li> <li>• controlled burns to maintain ecological diversity</li> <li>• progressive rehabilitation with native species for disturbed areas larger than 5ha within 18 months of completion of mining</li> <li>• rehabilitation of 100m wide riparian corridor along Bootes Creek diversion within existing mine</li> <li>• revegetation trials using SEVT species</li> </ul>
Fauna mortality and morbidity	<ul style="list-style-type: none"> <li>• on site vehicle speed limited to 70km/hr</li> <li>• provision of access to natural water supplies for native wildlife</li> <li>• riparian corridor fencing at road crossing to direct fauna into underpasses</li> <li>• lighting installation to avoid direct illumination of riparian and woodland habitat areas and where necessary use of shading devices to restrict illumination of these habitats</li> <li>• pre-clearance fauna survey and relocation</li> <li>• pest animal control strategies including: <ul style="list-style-type: none"> <li>○ artificial food source limitation</li> <li>○ participation in regional syndicated control programs</li> </ul> </li> <li>• provision of fauna habitat in rehabilitated landscapes with rocks and logs</li> </ul>

### 5.7.2 World heritage properties (sections 12 and 15A); National heritage places (sections 15B and 15C); and Great barrier reef marine park (sections 24B and 24C)

It is unlikely that any impacts would be apparent on these controlling provisions. Nonetheless, mitigation and management measures in place for the existing mining operation would be extended and combined with additional actions to minimise the project's indirect impacts on water quality within the catchment of the GBRWHA. Actions that would be undertaken include:

- reducing the project footprint to avoid or minimise the disturbance of natural vegetation and *in situ* soil through design and the delineation of clearing limits (on plans and by cadastral survey and or GPS) prior to the commencement of work
- minimising catchment sizes and mine affected water volumes through the use of clean water diversions and levees
- installing temporary erosion and sediment controls to minimise disturbance and the off-site transfer of sediment during construction
- collecting and treating mine affected water from within the project disturbance footprint to ensure operational discharges meet the quality standards required in approvals
- re-using mine affected water within the site for dust suppression and other beneficial re-uses
- for disturbed areas larger than 5ha rehabilitating with native species within 18 months of the completion of mining activities
- rehabilitation of the diversions of Bootes and Sandy creeks within the project area. A minimum corridor width of rehabilitation planting would apply as follows:
  - Bootes Creek – 100 metres
  - Sandy Creek – 50 metres
- storage of chemicals and fuels in accordance with AS 1940 – The storage and handling of flammable and combustible liquids
- design and implementation of a water quality monitoring program that assesses the performance and compliance of onsite controls
- regular inspection and assessment of water quality controls by suitably qualified and experienced persons
- amendment of existing site specific environmental management plans (such as the Rolleston Coal Water Management Plan and Rolleston Coal Environmental Management Plan) if required so that project controls are implemented in a timely and effective manner as part of the mine expansion.

### 5.7.3 Water resources

XCQ proposes to extend and apply the water management plan that has been developed for the Rolleston Coal Mine to manage both clean and mine-affected water on the Rolleston Coal Expansion project site. Clean water is to be diverted around the mine site via drainage realignments and two major creek diversions. Mine affected water, including runoff from disturbed areas and groundwater seepage into the pits, is to be captured in dams. It is only to be released to waters in accordance with performance requirements for the quality and flow rates of discharges relative to that in the receiving waters, as specified in the environmental authority issued under the *Environmental Protection Act 1994*.

XCQ proposes to enter into make good agreements with landholders whose bores are affected by groundwater depressurisation.

## 5.8 Estimates of disturbance and impacts

### 5.8.1 Listed threatened ecological communities

**Table 9** of this assessment report summarises the estimated current extent, and the area of clearing of each TEC within the project area.

**Table 9 Threatened ecological communities within the project area (Source: EIS Chapter 21, tables 21–7 & 21–8)**

Ecological community	EPBC Act status	RE relevant to project area	Area of community within project area (ha)	Area of community to be cleared within project area (ha)
Brigalow ( <i>Acacia harpophylla</i> dominant and co-dominant)	Endangered	11.4.8, 11.4.9 and HVR 11.4.9	51	42
Natural grasslands of the Queensland Central Highlands and Northern Fitzroy Basin	Endangered	11.3.21, 11.3.3 and 11.8.11 within Basalt Downs subregion	1751	1112

Ecological community	EPBC Act status	RE relevant to project area	Area of community within project area (ha)	Area of community to be cleared within project area (ha)
Semi – evergreen vine thickets of the Brigalow Belt and Nandewar bioregions	Endangered	11.8.6, 11.9.4 and HVR 11.8.6	194	51
Coolibah-black box woodlands of the Darling Riverine Plains and Brigalow Belt south bioregions	Endangered	11.3.3 and 11.3.27 within SBB bioregion	124	28

Specific advice on each TEC, including information on threats, impacts and mitigation and management measures as presented in Appendix Q-1 of the EIS, is included in Appendix B of this assessment report.

### 5.8.2 Listed threatened flora species

An analysis of the range, habitat requirements and available habitat within the project area identified the following threatened flora species as likely or possible to occur within the project area.

Likely to occur:

- a tufted grass (*Aristida annua*) – vulnerable
- king blue grass (*Dichanthium queenslandicum*) – vulnerable
- blue grass (*Dichanthium setosum*) – vulnerable.

Possible to occur:

- ooline (*Cadellia pentastylis*) - vulnerable
- *Marsdenia brevifolia* – vulnerable.

**Table 10** of this assessment report summarises the estimated current extent of potential habitat for each threatened flora species potentially occurring within the project area and the likely clearing area of those habitats.

**Table 10 Threatened flora species potentially occurring within the project area (Source: EIS Chapter 21, tables 21–10 & 21–11)**

Scientific name	Common name	EPBC Act status	Area of potential habitat (ha)	Potential habitat loss (ha)
<i>Aristida annua</i>	A tufted grass	Vulnerable	5,547	3,452
<i>Cadellia pentastylis</i>	Ooline	Vulnerable	194	51
<i>Dichanthium queenslandicum</i>	King blue-grass	Endangered	1751	1112
<i>Dichanthium setosum</i>	Blue grass	Vulnerable	1751	1112
<i>Marsdenia brevifolia</i>		Vulnerable	3796	2339

Field surveys did not find *Cadellia pentastylis* or *Marsdenia brevifolia* and XQC considered that impacts to these species were therefore unlikely. Specific advice on the threatened flora species likely to occur and likely to be impacted by the project, including information on threats, impacts and mitigation and management measures (as presented in Appendix Q-1 of the EIS), is included in Appendix B of this EIS assessment report.

EHP notes that the Australian government would require offsets for significant residual impacts on threatened flora species in accordance with the EPBC Act Environmental Offsets Policy.

### 5.8.3 Listed threatened fauna species

**Table 11** summarises the estimated extent of potential habitat for each threatened fauna species potentially occurring within the project area, and the potential loss of those habitats, based on an analysis of the range, habitat requirements and available habitat within the project area.

**Table 11 Threatened fauna species likely to occur and the potential habitat loss within the project area (Source: EIS Chapter 21, tables 21–13 and 21–14)**

Common name	Scientific name	EPBC Act status	Likelihood of occurrence	Area of potential habitat (ha)	Potential habitat loss (ha)
Red goshawk	<i>Erythrotriorchis radiatus</i>	Vulnerable	Possible to occur	5086	2891
Black-throated finch	<i>Poephila cincta cincta</i>	Endangered	Possible to occur	694	358
Australian painted snipe	<i>Rostratula australis</i>	Endangered migratory	Confirmed present	115	23
Squatter pigeon (southern)	<i>Geophaps scripta scripta</i>	Vulnerable	Confirmed present	5086	2891
Black-breasted button quail	<i>Turnix melanogaster</i>	Vulnerable	Confirmed present	193	51
South-eastern long-eared bat	<i>Nyctophilus corbeni</i>	Vulnerable	Possible to occur	5086	2891
Northern quoll	<i>Dasyurus hallucatus</i>	Endangered	Possible to occur	4898	2984
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Possible to occur	432	158
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	Endangered	Possible to occur	5279	2891
Ornamental snake	<i>Denisonia maculata</i>	Vulnerable	Likely to occur	2986	1786
Yakka skink	<i>Egernia rugosa</i>	Vulnerable	Possible to occur	4898	2826
Collared Delma	<i>Delma torquata</i>	Vulnerable	Possible to occur	745	400
Dunmall's snake	<i>Furina dunmalli</i>	Vulnerable	Possible to occur	745	400

Field surveys confirmed the presence of three threatened fauna species: *Rostratula australis*, *Geophaps scripta scripta* and *Turnix melanogaster*.

Specific advice on the following threatened fauna species likely to occur and likely to be impacted by the project, including information on threats, impacts and mitigation and management measures (as presented in Appendix Q-2 of the EIS), is included in Appendix B of this assessment report:

- australian painted snipe (*Rostratula australis*)
- squatter pigeon (southern) (*Geophaps scripta scripta*)
- black-breasted button-quail (*Turnix melanogaster*)
- ornamental snake (*Denisonia maculata*)
- southern-eastern long-eared bat (*Nyctophilus corbeni*)
- koala (*Phascolarctos cinereus*).

EHP notes that the Australian government would require offsets for residual significant impacts on listed threatened fauna species in accordance with the EPBC Act Environmental Offsets policy.

### **Indirect impacts**

The EIS provided an adequate assessment of the likely presence of EPBC Act listed ecological communities, threatened species and migratory species on the project site as well as the potential impacts on those values due to project activities causing direct disturbance.

The IESC highlighted the weakness of the EIS in assessing potential indirect impacts of the project on the values outside the project area, in particular on EPBC Act listed ecological communities, threatened species, migratory species and water resources. The IESC made specific reference to the potential for indirect impacts on Coolibah (*Eucalyptus coolabah*) woodland on alluvial plains and the threatened species they may support (e.g. *Geophaps scripta scripta*) as well as impacts on riparian vegetation that may support threatened species such as *Poephilia cincta cincta*.

Some changes were made to the EIS to clarify the low likelihood of potential impacts on groundwater dependent ecosystems (GDEs) as a result of groundwater depressurisation outside of Meteor Creek alluvium; an appropriate response to the IESC's concerns since groundwater depressurisation is the primary source of indirect impact that is relevant.

### **Cumulative impacts**

The project area and the surrounding area have been considerably modified by land use over a period of greater than 100 years. The surrounding area has predominantly been used for agriculture and grazing, however there are areas of protected estate and State forest immediately to the east, west and south. The proposed Meteor Downs South mine (MLA70452) is adjacent to the north of the project area. The next closest proposed mine is Bandanna Energy, 40km north of the project area. Other development proposed in the area includes coal seam gas extraction and associated gas pipelines.

The development of the Meteor Downs South project and the Rolleston Expansion project would result in the loss of 1146ha of the natural grasslands TEC. Both projects have the potential to impact on threatened fauna and their habitat; however the mobility of species and the relatively large home range of each species would reduce the significance of these impacts. Four threatened fauna species: the koala, south-eastern long-eared bat, red goshawk and squatter pigeon; would be impacted by both projects. Environmental offsets would partially compensate for the loss of habitat and would likely reduce but not prevent the long-term decline of these threatened species in the region.

### **Offsets**

Following implementation of proposed mitigation measures, the proposed action may result in residual significant impact to the following MNES:

- coolibah-black box woodlands TEC
- natural grasslands TEC
- brigalow TEC
- semi-evergreen vine thicket TEC
- ooline
- *Marsdenia brevifolia*
- *Aristida annua*
- king blue-grass
- blue grass
- ornamental snake
- black-breasted button quail
- squatter pigeon
- south-eastern long-eared bat.

XCQ has proposed offsets for residual significant impact to MNES confirmed or considered by XCQ as likely to occur in the project area as follows:

- coolibah-black box woodlands TEC – 28ha
- brigalow TEC – 42ha
- semi-evergreen vine thicket TEC - 51ha



- natural grasslands TEC – 1112ha
- king blue grass – 1112ha
- blue grass – 1112ha
- *Aristida annua* – 3452ha
- ornamental snake – 1786ha
- black-breasted button quail – 51ha.

However, the proposed offsets are not fully consistent with the EPBC Act Environmental Offsets Policy in that offsets were not proposed for all residual significant impacts. Direct impacts to foraging and breeding habitat for the squatter pigeon as well as roosting and breeding habitat for the south-eastern long-eared bat should also be provided (in the absence of further trapping surveys). Indirect off site impacts on threatened ecological communities, threatened species and migratory species have not been adequately assessed nor offsets proposed.

#### 5.8.4 Migratory species

The project area does not contain important habitat for migratory species and most migratory species occurring within the project area were considered to be at low risk of significant impact because of their wide range, extensive habitat outside the project area, and high mobility. Most wetlands within the project area would be retained. The magpie goose and the rainbow bee-eater may lose breeding habitat within the project area, but the loss of their breeding habitat was not considered to be significant.

**Table 12** lists the migratory species that were identified as known or likely to occur within the project area.

**Table 12 Migratory species known or likely to occur and the potential habitat loss within the project area (Source: EIS Chapter 21, Table 21–16)**

Common name	Scientific name	EPBC Act status	Area of potential habitat (ha)	Potential habitat loss (ha)
Magpie goose	<i>Anseranas semipalmata</i>	Marine	115	23
Fork-tailed swift	<i>Apus pacificus</i>	Migratory, marine	12758	5649
Great egret	<i>Ardea alba</i>	Migratory, marine	115	23
Cattle egret	<i>Ardea ibis</i>	Migratory, marine	2242	23
Latham's snipe	<i>Gallinago hardwickii</i>	Migratory, marine	115	23
White-bellied sea eagle	<i>Haliaeetus leucogaster</i>	Migratory, marine	115	23
White-throated needletail	<i>Hirundapus caudacutus</i>	Migratory	12758	5649
Rainbow bee-eater	<i>Merops ornatus</i>	Migratory	12758	5649
Satin flycatcher	<i>Myiogra cyanoleuca</i>	Migratory	432	158
Rufous fantail	<i>Rhipidura rufifrons</i>	Migratory	5279	2941

A migratory bird group dossier, including information on threats, impacts, and mitigation and management measures for each migratory species was presented in EIS Chapter 21, section 21.10, Migratory species.

### **5.8.5 World heritage properties (sections 12 and 15A); National heritage places (sections 15B and 15C); and Great Barrier Reef Marine Park (sections 24B and 24C)**

The EIS considered the potential for the proposed action to impact on the values of the GBRWHA, GBRNHP and GBRMP.

The project site is within the catchment of the Comet River which flows north and joins the Nogoia River to form the Mackenzie River, east of Emerald. The Mackenzie River joins the Dawson River to become the Fitzroy River approximately 85km south-west of Rockhampton. The mouth of the Fitzroy River marks the beginning of the GBRMP and GBRWHA and is approximately 675km downstream of the project area. No direct impact on the GBRWHA is predicted by the EIS; however the project is positioned within its catchment area. The EIS stated that in any case, water quality issues would be appropriately managed on the project site during construction, operation and decommissioning phases to protect the freshwater environments on the project site and therefore protect any values downstream associated with the GBRWHA, GBRMP and GBRNHP.

The EIS outlined the quality of water emerging from the existing mine and proposed that current approaches to water management as well as limits on the quality and volume of discharges should also apply to the project.

It is considered that the current impacts on surface water quality due to the RCM pose negligible risk to the values of the GBRWHA, GBRNHP and GBRMP. Maintenance or improvement of water quality would ensure that the new project would similarly pose a negligible risk to these values.

#### **5.8.5.1 Facilitated impacts**

The project would result in additional ships travelling through the GBRWHA and to the Port of Gladstone (PoG). The additional volume in traffic is considered small and within the scope of existing approvals for the port. An independent review of environmental management arrangements and governance of the Port of Gladstone (SEWPAC, 2013), provided an initial report on findings to the Australian Government on 30 July 2013. The independent review confirmed that it is possible to operate, manage and enhance ports within the GBRWHA whilst also adequately protecting the environmental attributes of the area.

According to the EIS, the additional mining areas would allow mine production to increase by 5Mt/yr to a maximum 19Mt/yr ROM coal and would require an additional 56 vessels per year for the transport of product coal to export markets. Gladstone Port Corporation's (GPC) 50 Year Strategic Plan forecasts an ultimate shipping capacity of more than 300Mt/yr, an increase of 428%. Based on existing shipping traffic forecasts for the PoG this equates to a 3.7% increase on existing traffic levels. The EIS noted that vessels of much greater capacity than the standard modelled (90,000t capacity) would be permitted to berth at both RD Tanna Coal Terminal (RGCT) and Wiggins Island Coal Export Terminal (WICET) (up to 220,000t). If these vessels are used then the projected increase in shipping traffic volume would be less. The EIS stated that the project would not significantly impact the operation of the PoG or the environmental values related to dust, noise or lighting and would not require additional port infrastructure.

Actions to manage facilitated impacts of the project were proposed in the EIS. This included advanced agreements for the loading and transport of product coal with the PoG. The EIS stated that the approval for the PoG required specific mitigation and avoidance measures and PoG has the capacity to accommodate the project's shipping needs. A new coal terminal located at Golding Point called the WICET would be available for additional coal product generated by the expansion project. The use of this port has been environmentally assessed and approved as part of the WICET approvals process.

The EIS stated that facilitated impacts, such as increased shipping in the GBRMP are proposed for further detailed consideration by XCC against the outcomes of a strategic assessment of the GBRMP. The Great Barrier Reef Marine Park Authority 2014, Great Barrier Reef Region Strategic Assessment: Strategic assessment report, GBRMPA, Townsville (GBR Strategic Assessment) has since been finalised. The EIS stated that XCC proposed to review the actions and responsibilities for facilitated impacts, in particular increased shipping in response to the findings of the GBR Strategic Assessment.

Based on the EIS, significant facilitated impacts on the values of the GBRWHA, GBRNHP and GBRMP are not anticipated. XCC would be required to update its assessment of facilitated impacts in response to the findings of the GBR Strategic Assessment.

#### **5.8.5.2 World heritage properties (sections 12 and 15A)**

According to the EIS, a risk assessment was applied to the significant impact criteria for potential impacts to a World Heritage property. The EIS concluded that the project would not have a significant impact on the World Heritage values associated with the GBR. This primarily relates to distance, as the proposed project is located a significant distance inland from the GBRWHA. Maintenance or improvement of water quality relative to that

discharged from the existing mine would ensure that the project would pose a negligible risk to the values of the GBRWHA.

XCQ committed in the EIS to minimise land disturbance at any one time and apply appropriate land management practices and mitigation measures. These measures along with suitable EA conditions would actively control the quality and quantity of mine affected water being released from the mine site. This would ensure that the water released into the lagoon of the GBRWHA is of a suitable quality. Accordingly, the construction, operation and decommission phases of the proposed project would not deliberately damage, directly or indirectly, the cultural and natural heritage values of the GBRWHA.

EHP is satisfied that the management and mitigation measures proposed would be sufficient to ensure the project would not have a significant impact on the GBRWHA.

#### **5.8.5.3 National heritage places (sections 15B and 15C)**

An action is likely to have a significant impact on the National Heritage values of a declared National Heritage property if there is a real chance or possibility that it will cause:

- one or more of the National Heritage values to be lost
- one or more of the National Heritage values to be degraded or damaged
- one or more of the National Heritage values to be notably altered, modified, obscured or diminished.

According to the EIS the assessment of potential impact to these values is constrained by the same factors considered in the assessment of the World Heritage values. Refer to section 5.8.5.2 of this assessment report and Table 21–6 of the EIS for the significant impact risk assessment of downstream impacts on GBRWHA. As such, and consistent with the conclusion for GBRWHA in section 5.8.5.2 of this EIS assessment report, XCQ considered that the downstream impacts of the project would not have a significant impact on the National Heritage values associated with the GBR.

EHP is satisfied that subject to appropriate water quality limits being established for proposed mine affected water releases, the management and mitigation measures proposed would be sufficient to ensure the project would not have a significant impact on a GBRNHP.

#### **5.8.5.4 Great Barrier Reef Marine Park (sections 24B and 24C)**

The EIS concluded that as no elements of the project occur in the GBRMP, the project would not have a direct impact on the values of the GBRMP. However, consideration has been given to the potential indirect impacts, particularly downstream impacts and facilitated impacts of the project.

### **5.8.6 Water resources (sections 24D and 24E)**

On 17 October 2013, the Minister for the Environment notified XCQ that he had determined that a water resource, in relation to coal seam gas development and large coal mining development was an additional controlling provision for the project. Because of this controlling provision, the assessment of the project's impacts on water resources is a relevant component of this assessment report.

The EIS stated it adopted assessment methodologies consistent with the Commonwealth's Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources and Draft significant impact guidelines: Coal seam gas and large coal mining developments — impacts on water. Consideration of groundwater dependent ecosystems (GDEs) was provided in sections 21.7, 21.8 and 21.9 and Chapter 13, Terrestrial flora and Chapter 15, Aquatic ecology.

A detailed review of the EIS assessment of potential impacts of the project on surface and ground water is provided in sections 4.12 and 4.13 of this EIS assessment report. The exhibited EIS was reviewed by the IESC, who provided advice to EHP and DOE.

#### **5.8.6.1 Groundwater**

The EIS relied on groundwater modelling to support the assessment of potential impacts. In particular, the EIS presented modelling contours for groundwater depressurisation based on assumption of the equivalent behaviour of alluvial and basalt aquifers.

XCQ subsequently clarified that in reality the alluvial and basalt aquifer systems are not connected and will behave independently. A massive, non-fractured basalt layer confined the deeper aquifer in fractured basalt at depths of generally over 20m below ground level. Moreover, available borehole data confirmed that rock and regolith above the massive basalt layer were unsaturated. In contrast, the alluvial aquifer is unconfined and follows into the riparian zone and floodplains of Meteor and Sandy Creeks, and to a lesser extent Bootes Creek. The EIS concluded that the drawdown of groundwater levels due to dewatering of the project's mine pits would increase

from that attributable to the existing mine. Modelling in the EIS indicated that groundwater levels within the saturated alluvial aquifer would decrease through drainage of groundwater through connected alluvial areas to the mining pits. The EIS noted that this potential loss of shallow alluvial groundwater would be permanent and limited to alluvium directly connected to the pits and its general occurrence was limited to the Meteor Creek alluvium. The extent of this loss from the alluvial aquifer was limited upstream by the sandstone barrier of the Consuela anticline and downstream by a basalt barrier within Albinia National Park. Some recovery of the alluvial aquifer is expected following mining, although a net permanent movement towards the residual mine pits is expected.

Depressurisation and drawdown in the deeper basalt aquifer may reduce groundwater levels in a number of landholder bores, noting that most affected bores are on land now owned by XCQ. The net groundwater inflow to residual mine voids is expected to be permanent due to the losses from evaporation of the exposed pit waters. The EIS predicts that groundwater drawdown in the basalt aquifer would reach 'quasi-equilibrium' after about 200 years, progressively extending further laterally and potentially affecting more bores.

The IESC was generally satisfied with the groundwater modelling but expressed some reservations about the parameter setting for the alluvial aquifer. It had more substantive concerns about the limited assessment of the potential ecological impacts of groundwater drawdown.

According to the EIS, there are no wetlands adjoining the project area that are fed by aquifers that would be vulnerable to depressurisation, since wetlands within the depressurisation zone are fed by either surface flows or perched aquifers.

As noted in section 5.8.5 above (and section 4.13), some changes were made to the EIS to clarify the potential impacts on GDEs as a result of groundwater depressurisation, which responds to the IESC's concerns. Additional information provided by XCQ has clarified that GDEs above the basalt aquifer are unlikely to be affected by any depressurisation within it. This information has also clarified that the total estimate of GDEs above the alluvial aquifer and located outside the project footprint – i.e. to the north and east - that could be affected by groundwater depressurisation is 121ha. A small part (approximately 2.5ha) of this potentially affected GDE area is within Albinia National Park.

It is concluded that further assessment and monitoring will be required to clarify the ecological values at risk, evaluate the impact of the expansion project and guide appropriate management responses.

#### **5.8.6.2 Surface water**

While the IESC had some reservations, EHP is satisfied that the EIS provided generally robust hydrological and hydraulic modelling of surface flows, using a combination of one-dimensional modelling for Bootes Creek and two-dimensional modelling for Sandy and Meteor Creeks. Potential impacts on flood behaviour along the latter waterways were well characterised.

Within the middle reach of Meteor Creek affected by pit dewatering, the EIS predicted that there would be a total permanent loss of stream baseflow from groundwater. Further, the EIS modelling predicted that the average number of no-flow days in Meteor Creek would increase by 57 from 74 days to 131 days per year. The EIS stated that other watercourses are not expected to lose baseflow from groundwater as they are not directly connected through the alluvium to the mine pits and final voids.

The EIS concluded that this impact of loss of baseflow in Meteor Creek would not have significant ecological consequences, in light of the typical dynamics of ephemeral streams in the region, involving ecological regeneration in response to high flow events. Patterns of high flow events are not expected to be affected by the project. The EIS concluded that sufficient surface flows would be maintained to support the ecology of the streams.

The EIS provided a limited assessment of existing water quality conditions and the potential impacts of mine-affected discharges on the ecological and other environmental values of surface waters. The EIS stated that the current discharge limits for the RCM have not adversely affected environmental values in the relevant watercourses and hence are suitable to be applied to the project.

To confirm this further assessment and monitoring of water quality and ecological values along the affected waterways will be required to clarify the values at risk and guide appropriate management responses.

#### **5.8.6.3 Impacts to aquatic ecology**

Consistent with the summary of the assessments of potential ecological impacts arising from changes to groundwater and surface waters, the EIS concluded that the likelihood of adverse impact to aquatic ecosystems from the predicted losses of baseflow in Meteor Creek is low due to:

- the reliance of the ecosystems in this ephemeral stream on high flow events to drive their regeneration
- sufficient surface flows being maintained to maintain the base ecological functioning of the streams.

## 5.9 Major issues raised

DOE requested XCQ outline the criteria for how offsets would be selected (considering tenure and certainty that the conservation aims could be achieved) and the manner (timing, mechanism for protection) in which these offsets would be provided. XCQ responded and provided an Offset Strategy that outlined the key stages and deliverables for the proposed offsets. XCQ indicated that their preference was to deliver direct offsets on XCQ's owned properties: Meteor Downs and Mount Kelman. Section 4.3.12 of the Offset Strategy provided an overview of the Meteor Downs property. Section 4.2.1 provided the results of a landscape assessment demonstrating the availability of offset values in surrounding areas that could make up any shortfall in offset obligations not met by offset proposals on Meteor Downs or Mount Kelman.

EHP is satisfied that XCQ could meet their EPBC offset obligations for direct impacts either on their own properties or on other properties in surrounding areas.

EHP raised concerns that collared delma and south-eastern long-eared bat could suffer significant impacts as a result of the proposed action and therefore justified a re-assessment of the likely impacts on these species. XCQ responded that they did not consider a re-evaluation necessary based on the information provided in the EIS. EHP maintains concerns with respect to the south-eastern long-eared bat and recommends that offsets be provided for the roosting and breeding habitat of south-eastern long-eared bats.

Lock the Gate Alliance and several individual submitters raised concerns about the lack of assessment of cumulative impacts on threatened ecological communities and species, with particular reference to Black-breasted button quail and South-eastern long-eared bat. XCQ responded that they had based their cumulative impact assessment on the project and Meteor Downs South project and that it was a qualitative assessment, as a quantitative assessment could not be carried out. EHP acknowledges the inadequacy of XCQ's cumulative impact assessment, however in assessing the project EHP considered the cumulative impacts of other development projects on threatened communities and species in their deliberations.

Several individual submitters, including the Fitzroy Basin Association raised concerns about the loss of threatened ecological communities and species. XCQ directed submitters to areas within the EIS where they had outlined the actions that would be taken to avoid, minimise, mitigate and offset impacts to threatened ecological communities and species. EHP considers that XCQ's response was adequate.

U&D Mining Industry which proposes the adjacent Meteor Downs South Coal Mine project on MLA70452 and anticipates construction to commence in early 2015 has concerns about its mining tenement being presented in the Offset Strategy as an offset area. XCQ responded that if the mining lease were to be approved, then this area would not be considered as an offset for the project. Should the project proceed, EHP recommends that the MLA70452 not be proposed as an offset area and that the Offset Strategy be updated and re-submitted.

Further assessment and monitoring will be needed to better establish baseline conditions as well as a suitable monitoring program and management triggers, both for groundwater in the alluvial aquifer that could affect GDEs outside the project footprint and for surface waters that would receive discharges of mine-affected waters.

## 5.10 Conclusions and recommendations

EHP is satisfied that suitable offsets will be available to address expected impacts on EPBC Act listed communities, species and migratory species.

Further, EHP is satisfied that potential impacts on the values of a World Heritage Property; a National Heritage Place; and the Great Barrier Reef Marine Park, as well as on water resources, have been adequately assessed and will not be significant.

General conclusions and recommendations on MNES are listed below. Refer to recommendations for conditions at Appendix A (for any environmental authority) and at Appendix B (for any EPBC approval) respectively of this assessment report.

### **Recommendation – EPBC TEC – Coolibah-black box woodlands and Brigalow**

The project would have a direct impact on the listed threatened ecological communities Coolibah-black box woodlands and Brigalow. Offsets have been proposed for those impacts. There is some potential for indirect impacts on these TEC's from groundwater depressurisation, and possibly changed surface flows and water quality. EHP recommends that remaining remnant and regrowth Coolibah-black box woodlands and Brigalow TECs, off the project site that could be affected by hydrological changes, be monitored for deterioration in their ecosystem health. Appropriate management strategies must be put in place to avoid impacts. Where losses are unavoidable, offsets must be provided.

### **Recommendation – management of impacts to MNES**

XCQ should develop threatened species management procedures to avoid and minimise impacts to listed threatened species and implement these procedures over the life of the project, including during vegetation clearing.

### **Recommendation – pre-clearance surveys and offsets for unanticipated species**

Pre-clearance surveys should be carried out by a suitably qualified person. The presence of any EPBC listed species shall be reported to DOE and EHP for their determination as to whether the species presence constitutes an important population, and if the clearing constitutes a significant residual impact to the matter.

XCQ should implement additional measures for avoiding or mitigating any disturbance to EPBC Act listed species found in a pre-clearance survey that were not listed in the EIS as known or likely to occur in the project area. Such species could include species listed in the EIS as possible to occur. For example: Ooline, *Marsdenia brevifolia*, yakka skink, collared delma, Dunmall's snake, red goshawk, black-throated finch, northern quoll and spotted-tailed quoll. Where significant residual impact to a listed species or their habitat is considered likely, an offset must be provided for the unanticipated impact in accordance with the EPBC Act environmental offset policy.

### **Recommendation – EPBC offset requirements**

XCQ should reassess required offsets in accordance with the EPBC Act Environmental Offset Policy (2012). A revised offset strategy should include the provision of offsets for direct impacts to foraging and breeding habitat for the squatter pigeon, as well as roosting and breeding habitat for the south-eastern long-eared bat (in the absence of further trapping surveys).

### **Recommendation – conditions for any environmental authority**

The recommendations for conditions in Appendix A of this assessment report should be considered in developing any environmental authority for the project.

### **Recommendation – conditions for any EPBC approval**

The recommendations for conditions of approval under the EPBC Act should consider relevant information summarised in Appendix B of this assessment report.

### **Recommendation – State offsets**

XCQ should develop an offset delivery strategy that includes the quantification of impacts to MNES and State Significant Biodiversity Values (SSBV) (that are not overlapped by MNES values) for the life of the project. The plan should address:

- detailed quantification of all MNES and MSES impacts and offsets quantified in accordance with Queensland Herbarium remnant vegetation mapping
- offset availability by tenure with focus on EHP's Galilee Basin Offset Strategy in order to ensure viable long-term landscape conservation outcomes
- co-located offsets for both MNES and SSBV on the same land parcel with preliminary desktop assessment of where these land parcels can be found
- desktop assessment to identify areas of overlap between Commonwealth and State offset requirements
- field assessment to define locations for 90% of the MNES and SSBV offset requirements outside of MLA70452.

## **6 Adequacy of the environmental management plan**

The EM plan for the project was provided with the EIS and updated with supplementary information during the EIS assessment process. For the purposes of this report EHP expects XCQ to consider the outstanding issues outlined in this report and make the necessary amendments to the EM plan prior to submitting the amended EM plan to EHP for final assessment. The EM plan was prepared in accordance with the former section 203 of the EP Act.

In giving approvals under the EP Act, EHP must address the regulatory requirements set out in the Environmental Protection Regulation 2008 and the standard criteria in the EP Act in the context of specific information about the environmental impacts of a project provided through an EIS or EA application. The model mining conditions (EM944) for site specific EAs for mining projects will be considered and applied as appropriate to achieve environmental protection outcomes based on the information provided by the applicant and an assessment of the risk of environmental harm.

Furthermore, all new dams and levees proposed to be constructed as part of the expansion project would have their consequence categories assessed according to EHP's Manual for assessing consequence categories and hydraulic performance of structures (EM635). The draft EM plan should include contemporary conditions for regulated structures based on the Guideline on structures which are dams or levees constructed as part of an ERA (EM634). Final consequence category assessment would be undertaken by a Registered Professional Engineer in Queensland (RPEQ) for the dams and levees before construction commences.

Recommended conditions of approval should the project be approved are set out in further detail in Appendix A.

The draft EM plan generally included the expected range of information on the proposal including:

- tenure description
- the operational aspects and rehabilitation proposed
- consultation
- notifiable activities
- approvals
- environmental values of the site
- potential impacts
- management strategies
- commitments
- proposed draft EA conditions.

The draft EM plan was proposed for the combined operation of the existing operation and the proposed mine expansion. The draft EM plan, in conjunction with the EIS main reports, did provide generally sufficient information to describe the impacts of the proposal and the proposed means of managing and minimising those impacts and was therefore suitable for this EIS process.

It is a legislative requirement that environmental commitments and protection objectives be included in an EM plan including management strategies and measurable indicators to ensure that the environmental objectives will be achieved. Any subordinate management plans identified in the EIS for the management of environmental values should form part of a final EM plan.

Many of the outstanding matters identified in this report are focused on resolving aspects of the EM plan, consequently the EM plan would require significant changes before it is suitable and before a decision could be made to grant an amended EA for the project. Guidance on the content of an EM plan is available at the former section 203 of the EP Act and in departmental guidelines.

Key aspects of the EM plan that will need to be refined for the project relate to the strategies needed to protect the values of Albinia National Park and sections of Bootes Creek and Meteor Creek passing through it, in particular to establish:

- a robust baseline assessment of environmental values that could be affected
- appropriate monitoring points for groundwater, surface water quality and flows, and ecological conditions
- appropriate WQO, as well as investigation and mitigation triggers, and discharge limits
- an accountable framework for adaptive responses to mitigate adverse hydrological changes
- an appropriate program for managing run-off as well as mine discharges within the mine lease area, to both protect downstream values and contribute to environmental quality more generally.

## 7 Outstanding matters

### 7.1 Climate

No outstanding matters.

### 7.2 Air

The dispersion modelling was based on a number of limitations and assumptions in the modelling methodology resulting in degrees of uncertainty including:

- assumptions in the published NPI and AP-42 emission factors used
- all activities assumed to occur continuously for 24 hours per day
- emission rates modelled as a constant rate for the duration of the modelled year while real emission rates are likely to be variable such as episodic emission rates from blasting activities.

Such uncertainties reflect the need for ongoing monitoring to verify real emissions by the project as it proceeds.

The existing EA for the RCM does not include a specific condition for TSP. EIS Chapter 11, Air Quality and EIS Appendix I1, Air Quality Impact Assessment did not identify offsite impacts due to TSP.

The emissions inventory (EIS Appendix I1, Air Quality Impact Assessment) did not identify combustion sources as a significant emission source. PM<sub>2.5</sub> monitoring and relevant EA conditions have therefore not been included in the EIS draft EM plan.

### **7.3 Greenhouse gas emissions**

The likely sources of GHG emissions for the construction phase of the project were identified, but not fully assessed. The estimated GHG emissions from the construction phase of the project should be estimated and suitably assessed.

Despite the greenhouse gas abatement measures tabled in the EIS, there was no addressing of the TOR to include a specific module in the draft EM plan. The module should provide detail on the intended objectives, measures and performance standards to avoid, minimise and control GHG emissions.

### **7.4 Land**

The RIDA process under the RPI Act would establish the required mitigation for project impacts on PAA and SCA, should the project proceed.

It is recommended that XCQ continue to liaise with the DSDIP, DNRM and DAFF and to discuss and resolve the RIDA process.

### **7.5 Waste management**

No outstanding matters.

### **7.6 Surface water**

The IESC made the following recommendations in relation to monitoring of surface waters:

- relocation of upstream monitoring stations to locations upstream of all known mechanisms of potential impact (from the project and RCM), including groundwater drawdown and potential seepage from mine dams and landforms
- establishment of background aquatic ecosystem values prior to commencement of dewatering or ground disturbance works for the project to ensure background values are not influenced by project activities.

The IESC also suggested that the REMP be designed to:

- measure seasonal and inter-annual variations in hydrology and water quality within Bootes Creek, Sandy Creek and Meteor Creek
- measure seasonal and inter-annual variation in the health of aquatic and groundwater dependent ecosystems.

Based on this assessment, particular attention should be paid to gathering all water quality and stream value reports and also establishing suitable background water quality sites. Compilation and interpretation of the full suite of existing water quality data and stream environmental values will assist in establishing appropriate background water quality conditions on which to base trigger levels for proposed releases. However, in light of the IESC's above recommendations, additional data is likely to be needed to do that.

The focus of establishing triggers should be preservation of the values of the immediately downstream HEV area in accordance with the requirements of the EPP Water as well as in implementing the appropriate elements of the model mining conditions. In addition to TSS and salinity/conductivity, all relevant indicators should be considered having regard to the both the discharge and the receiving environment downstream.

Implementation of the project would warrant effective control and enhancement of the quality of both mine discharges and on lease catchment run-off to protect aquatic and riparian ecosystems, especially within and adjoining Albinia National Park.

Prior to establishing water quality discharge criteria it is recommended that the following steps be applied:

1. a robust baseline assessment of environmental values within affected watercourses
2. compilation and interpretation of all available relevant water quality data
3. establishment of appropriate WQO and discharge conditions to protect the environmental values of affected watercourses including aquatic ecological and riparian values in the section of Meteor Creek passing through Albinia National Park
4. application of the baseline assessment to both design and justify a suitable REMP



5. development and progressive implementation of an integrated site and water management plan for the whole of the project and RCM Mining Lease/Mining Lease Application area. The objective of this plan would be to support the achievement of WQOs to the extent this is influenced by all activities within this area. This plan would include measures to manage impacts on watercourses, including downstream of the Sandy Creek diversion and all mine-affected discharges and runoff during the period of mine construction, operation and rehabilitation.

## 7.7 Groundwater

In order to protect the environmental values of Albinia National Park, it will be necessary to establish an effective program for monitoring groundwater drawdown in the alluvial aquifer in the vicinity of the park, in combination with appropriate investigation and mitigation triggers. A limited program should also be required to confirm that the wetland within Albinia National Park is not affected by the interaction of surface waters with the basalt aquifer.

It is recommended that the program and triggers be agreed by EHP, QPWS, DNRM and DOE, and then incorporated into the EA conditions for the project within the framework of the required EMP. These measures will need to be complemented by a suitable baseline assessment and monitoring program for the potentially affected GDEs including, riparian GDEs along the sections of Meteor Creek and Bootes Creek within Albinia National Park.

## 7.8 Ecology

### 7.8.1 Regional Ecosystems Mapping

EHP requested that XCQ seek Queensland Herbarium review and acceptance of the revised regional ecosystem mapping for the proposed project area. XCQ has subsequently submitted their revised mapping to EHP for Queensland Herbarium review and are awaiting a response.

**Table 6** of this assessment report presents an overview of the potential impacts on vegetation based on the existing regional ecosystem mapping certified by the Queensland Herbarium. The REs that would be affected by the project, and the extent of the impact, were determined by EHP using certified RE mapping and spatial data for the project footprint provided by XCQ. It is likely that the Queensland Herbarium certification process for XCQ's revised RE mapping would result in changes in the areas shown in **Table 6**. If aspects of XCQ's mapping are not accepted, this would have implications for offsets required. Outstanding aspects of the impact assessment noted earlier would also need to be resolved and quantified prior to determining the full extent of impact and offset requirement should the project proceed.

### 7.8.2 Wetlands

The EIS did not adequately address the loss of the WPA (ID 45027) on site. This type of wetland is a MSES which is a prescribed environmental matter under the Environmental Offsets Regulation 2014. It is also a SSBV under the QBOP under which this project is being assessed. Resource activities carried out under an EA under the EP Act are subject to offset assessment for residual impacts to SSBVs under the QBOP. Further clarification is required as to whether any of the WPA has been included in proposed offsets. An offset for a WPA must include the high ecological significance wetland and the surrounding trigger area as described above.

The EIS indicated that wetlands would also be cleared corresponding to sections of Meteor Creek on MLA70458 and MLA70416. However, no details were provided in the EIS as to its exact location, quantification of area or aquatic habitat values. Catchment modification would also likely result in changes to ground and surface flows and water quality. No analysis was provided in the EIS to quantify the likely nature and scale of these changes. The EIS has not appropriately addressed the values of wetlands potentially impacted by the project nor assessed the nature and scale of impacts to them.

## 7.9 Transport

According to the EIS the project would significantly impact the traffic operation of the Carnarvon, Gregory and Dawson Highways. The EIS did not address any mitigation measures that include contributions to road works, rehabilitation and maintenance of State-controlled roads.

A detailed map of the proposed re-alignment of Springwood Road should be provided showing the proposed routes of the two options. The construction of the preferred option one may have potential impacts on Sandy Creek and Meteor Creek. Potential impacts and proposed mitigation measures on the watercourse values should be provided.

The cumulative transport impacts section of EIS does not thoroughly examine developments located near to the site and their potential relative and combined magnitude of impact on the existing transport infrastructure. Only one project (Meteor Downs South Project) out of the seven developments located near to the site was assessed. The uncertainty surrounding the impact of this project on the surrounding road network should be assessed post EIS in further consultation with DTMR and CHRC.

## **7.10 Noise**

No outstanding matters.

## **7.11 Economics**

In its review of the amended EIS, LTGA indicated that the EIS failed to suitably address agricultural land values important to current and future production, including to quantify the potential economic impacts on land currently used for agriculture or land with the potential use for agriculture using the Central Queensland Agricultural Land Audit, May 2013 (and amended October 2014). Furthermore, LTGA stated that the EIS did not provide a suitable cost-benefit analysis or economic assessment of the proposed mine operations on the region's agricultural industry. It did not quantify the potential negative economic impacts of the proposed project on the region's agricultural industry, including direct impacts, such as the loss of productive land and clean water, and indirect impacts, such as the dislocation of rural businesses and changes in the socio-economic fabric of the Central Highlands region.

## **7.12 Social**

No outstanding matters.

## **7.13 Cultural heritage**

No outstanding matters.

## **7.14 Landscapes and visual amenity**

No outstanding matters.

## **7.15 Hazard and risk**

The amended EIS outlined the use of the Mine Operating System, the Incident Management Manual, the Principal Hazard Management Plan and Incident Response Plan. The QFES stated that it did not receive details of these plans and as the project is an extension of the existing RCM, the existing plans would be adequate and would be reviewed, as required. However, QFES stated that the EIS outlined that the Mine Operating System, the Incident Management Manual and the Fire Management Guidelines would be updated, but no timeframe were provided. Hence, QFES would expect that the update should be carried out within three months of the project's approval and reviewed annually as required under the Building Fire Safety Regulation 2008.

The QFES also commented that the reference to the Queensland Fire and Rescue Service would need to be changed to the new departmental name, the Queensland Fire and Emergency Services.

The Queensland Ambulance Service stated that XCC should commit to providing QAS with a copy of the key contact list and the emergency response plan, as it requires these documents in the event of an emergency or extraordinary event.

## **7.16 Health and safety**

No outstanding matters.

## **7.17 Rehabilitation and decommissioning**

The EIS states that actions to avoid or minimise fragmentation of habitat were described and that actions include revegetation of Meteor Creek. However no detailed reference to revegetation of Meteor Creek or re-establishing riparian connectivity was provided in the EIS, other than to acknowledge the localised effects of habitat fragmentation and connectivity on ML70415 and potential offset land on Meteor Downs, and existing vegetation outside the project area to provide connectivity between Albinia National Park and Mount Hope State Forest. The revegetation concerns addressed in this EIS assessment report should be incorporated into the EM plan.

## **7.18 MNES**

Indirect impacts resulting from the matters raised in section 5.8.6, water resources, have not been quantified nor suitably assessed and it is likely that further avoidance, mitigation and offset measures would be required to address indirect impacts.

EHP is concerned that collared delma and south-eastern long-eared bat could suffer significant impacts as a result of the proposed action and therefore justified a re-assessment of the likely impacts on these species and recommends that offsets be provided for the roosting and breeding habitat of south-eastern long-eared bats.

Further assessment and monitoring would be needed to better establish baseline conditions as well as a suitable monitoring program and management triggers, both for groundwater in the alluvial aquifer that could affect GDEs outside the project footprint and for surface waters that would receive discharges of mine-affected waters.

## 8 Recommended conditions of approval

Throughout this EIS process a number of environmental impacts and relevant mitigation measures have been identified. Where the EIS has shown that such impacts are likely and where legislation, policy or guidelines dictate, some activities associated with the project would need to be constrained to achieve acceptable environmental outcomes through conditions of approval. In some cases in the absence of detail about a particular matter the EIS has made commitments to achieve suitable outcomes.

### 8.1 Environmental Protection Act 1994

Outstanding matters that need to be addressed under the EP Act include the completion of the EM plan. These requirements are described in section 7 of this report.

To suitably implement the project and as required under section 59 of the EP Act, this report includes a set of recommended conditions for approval at Appendix A.

The conditions are not considered complete nor finalised and are provided for consideration in developing final conditions if an EA is granted for the project. They are based largely on EHP's model mining conditions and are provided for consideration in developing draft EA conditions for the project under the EP Act. The administering authority will decide the specific conditions to be applied should an approval be granted.

### 8.2 Nature Conservation Act 1992

The *Nature Conservation Act 1992* (NC Act) has been amended to create a new risk-based approach to regulate the clearing of protected plants. This means only high risk clearing requires assessment.

A clearing application must be made for plants that are listed as endangered, vulnerable or near threatened (EVNT), unless otherwise authorised under the protected plant exemption.

The taking of protected animals, including their movement or relocation, requires an authority under the NC Act, unless the taking happens in the course of a lawful activity that was not directed at the taking and the taking could not have been reasonably avoided.

The NC Act and the Nature Conservation (Wildlife) Regulation 2006 state that any person taking, using or interfering with protected fauna requires authority or an exemption. Authorities for mining may be issued by way of a Rehabilitation Permit or Species Management Program. No specific conditions were recommended in the EIS process as they will be established at the time NC Act decisions are made.

### 8.3 Environmental offsets

On 1 July 2014, a new environmental offsets framework was introduced in Queensland; namely the *Environmental Offsets Act 2014*; the Environmental Offsets Regulation 2014 and the Queensland Environmental Offset Policy 1.1 2014 (EOP) and associated guidelines. The EOP framework provides an outcome-based approach to offsets including delivery options:

- financial settlement
- land-based offsets
- offsets delivered as actions in a Direct Benefit Management Plan.

Or combinations of these approaches where offset conditions specify staged offsets can also be delivered.

Section 1.1.5 of the EOP allows for consideration of this policy for an application made but not decided prior to 1 July 2014. Otherwise, the policy in place at the time the application is made is to be applied.

XCQ has committed to provide offsets in accordance with the Queensland Biodiversity Offsets Policy 2008 (QBOP) which applied at the time the application to amended EA was made. Therefore, any offset proposal would be developed in accordance with the QBOP. The QBOP aims to increase the long term protection and viability of the state's biodiversity where residual impacts from a development, on an area possessing State Significant Biodiversity Values (SSBVs), cannot be avoided. It aims to achieve a no net loss of biodiversity.

An offset plan needs to be developed and implemented to address the objectives of State legislation and policy requirements for environmental offsets. This strategy should be included in a revised EM plan for the project.

In addition, Environmental Offset Policy, October 2012 (EPBC EOP) under the EPBC Act would also apply to significant residual impacts to MNES. Offsets required under the QBOP for impacts to SSBVs can, in some cases, be co-located with offsets required for impacts to MNES where they are substantially the same matter.

Recommended offset EA conditions have been provided in Appendix A.

## **8.4 Fisheries Act 1994**

DAFF submission on the EIS noted that there would be road and waterway crossings. Fisheries Queensland's self-assessable codes, guidelines and fact sheet for waterway barrier works would apply to the outside mine areas only. The codes are to be considered for works within waterways which trigger a waterway barrier works approval under the *Sustainable Planning Act 2009*. DAFF also recommends that XCQ consider the codes as guidelines for works within natural waterways within the boundaries of the MLA.

The following Fisheries Queensland's self-assessable codes, guidelines and fact sheet for waterway barrier works that would apply outside the ML area include:

- DAFF Code for self-assessable development – WWBW01 Minor Waterway Barrier Works Part 1; low impact dams and weirs, January 2013
- DAFF Code for self-assessable development – WWBW01 Minor Waterway Barrier Works Part 3; culvert crossings, April 2013
- DAFF Code for self-assessable development – WWBW01 Minor Waterway Barrier Works Part 4; bed level crossings, April 2013.

## **8.5 Transport Infrastructure Act 1994**

Department of Transport and Main Roads (DTMR) reviewed XCQ's response regarding the issues raised in the department's EIS submissions and were satisfied with some of XCQ's proposed mitigation measures. However, further assessment would be required including:

- state-controlled roads used by construction and operational traffic, in particular drive-in drive-out workers, an assumption has been made that the Blackwater-Rolleston Road would not be used and that all project traffic would use higher-level roads. There is a large section of unsealed road that would be heavily impacted by project traffic if used to access the project site. Using current project traffic projections, XCQ must identify how frequently the Blackwater-Rolleston Road is used to access the project site and identify any mitigation measures required. Given it is not possible to prohibit workers use of this route, XCQ should assess an alternative (worse-case) scenario in which a significant percentage of works do use this route. This alternative should also detail what mitigation strategies would be required if this traffic use happens. XCQ is encouraged to develop road-use management strategies to ensure the use of higher level routes.
- A full assessment of the potential impacts of additional project traffic on potentially affected intersection, using turn warrants in chapter 13 of the Road Planning and Design Manual. Further assessment would be required to identify how the Carnarvon Highway/Dawson Highway at Rolleston intersection would be impacted. The Carnarvon Highway/ Dawson High intersection currently has no additional turning lanes or pockets.
- section 7.6.5.3, Heavy vehicles and vulnerable structures of the EIS states in comparison to section 7.6.1.4 (Road Traffic Generation) the heavy vehicle component is considered not significant. The information provided in section 7.6.1.4 should not be utilised as a justification of heavy vehicle traffic generation as not being significant. When finalising the RIA, XCQ must review potential impacts of project heavy vehicle traffic on structures to confirm no significant impacts arise.

DTMR advised it is not in a position to fund the safety improvements that may be required, nor would it be likely that this funding could be made available to undertake the immediate works necessary to ensure the ongoing safety and efficiency of the SCR network for the proposal to proceed with the construction phase. Therefore, once further information is available on the final design of the project, XCQ is required to undertake a review of the RIA and provide an updated assessment which clearly identifies any necessary safety improvements works, rehabilitation and maintenance costs to mitigate the impacts of project traffic prior to undertaking any construction works. It is strongly recommended that XCQ continue to liaise with DTMR to discuss and resolve these issues in a timely manner.

Recommended road transport conditions have been provided in Appendix C.

Maritime Safety Queensland is the regulator for maritime matters as they relate to safety of navigation and prevention of ship-sourced pollution in Queensland. Maritime Safety Queensland reviewed XCQ's response to the issues raised in the EIS submission and were satisfied with some of XCQ's proposed mitigation measures. However, further consultation is required regarding a number of issues not adequately addressed in the EIS, including:

- a. XCQ must consider the climate of the ports where construction material would be imported (Mackay) and coal product exported (Gladstone) and put in place appropriate mitigation measures for any associated risks for project shipping. This assessment would also be needed when developing the shipping plans/schedules and any cyclone contingency plans (if required) in conjunction with, and to be approved by, the relevant Regional Harbour Master
- b. XCQ should quantify and assess the level of increased shipping traffic (and types) due to the import of construction materials through the port of Mackay (with discussions and approval by the relevant Regional Harbour Master), or at least discuss this with the relevant Regional Harbour Master if the impacts likely to be are negligible. Scheduling and operational aspects of any specialised cargo or ship to the port of Mackay needs approval from the Regional Harbour Master, in accordance with the Harbour Master's direction under Sections 86 and 86A of the *Transport Operations (Marine Safety) Act 1994*
- c. XCQ should identify and consider the impact of increased shipping and new types of shipping traffic in the port of Gladstone in the context of LNG shipments also transiting the port (due to begin at the end of 2014), as well as other ship traffic increases due to WICET and other port developments. The background shipping traffic forecasts used for the shipping impact assessment in the EIS are from 2013 and should be updated. The intended size and type of export vessels (and their intended shipping routes) must also be discussed and approved by the Regional Harbour Master before construction begins to ensure that decisions and issues about aspects such as berths, dredging and swing basins can be suitably made. These matters would need be discussed and approved by the Regional Harbour Master (Gladstone) in accordance with the above legislation for safety and ship-sourced pollution matters, and not just discussed with staff from Gladstone Ports Corporation
- d. the *Transport Operations (Marine Safety) Act 1994* and Transport Operations (Marine Safety) Regulation 2004 should be included as principal legislation relevant to the traffic and transport impact assessment. They must be considered and followed when developing shipping plans and schedules. Any shipping contracts must include compliance with these, any other relevant maritime legislation and the relevant port procedures
- e. the *Transport Operations (Marine Pollution) Act 1995* and Transport Operations (Marine Pollution) Regulation 2008 should be included as principal legislation relevant to the traffic and transport impact assessment. They must be considered and followed when developing shipping and waste management plans. Any shipping contracts must include compliance with these, any other relevant maritime legislation and the relevant port procedures.

Maritime Safety Queensland advised is not in a position to fund any safety improvements that may be required, nor would it be likely that this funding could be made available to undertake the immediate works necessary to ensure the ongoing safety, health and efficiency of the maritime/shipping environment and traffic conditions for the proposal to proceed. Therefore, once further information is available on the final design of the project, the XCQ is required to undertake a review of the shipping and port traffic aspects of the project (for both construction material imports and coal product exports) and provide an updated assessment that clearly identifies any necessary safety improvements works, rehabilitation and maintenance costs to mitigate the impacts of project traffic before any work begins. It is strongly recommended that XCQ continue to liaise with the relevant Regional Harbour Masters (Gladstone and Mackay) to discuss and resolve these issues in a timely manner.

Recommended maritime safety and pollution prevention conditions have been provided in Appendix C

## 9 Suitability of the project

Consideration of the suitability of the project needs to have regard to potential impacts on its receiving environment, in the context of the standard criteria, the EIS and submissions on the EIS. Notable aspects of the receiving environment of the project are that the site:

- is in a semi-natural condition with significant terrestrial ecological values as well as watercourses that retain substantial ecological values
- adjoins the Albinia National Park while also draining to ephemeral watercourses that flow through this national park
- has an extensive confined aquifer in fractured basalt as well as a shallow, unconfined aquifer in alluvium, primarily along the course of Sandy Creek and Meteor Creek
- adjoins the existing RCM, abutting rural land that is mostly in the ownership of XCQ
- is located within a Priority Agricultural Area and has extensive soils with good productive potential, although productivity in the area is strongly constrained by rainfall. While part of the project area has been cropped, most of it has been grazed in recent years

- is located in the upper part of the Fitzroy River Basin, in which downstream environmental values are vulnerable to cumulative impacts on water quality from mining and agricultural activities, and which discharges to the Great Barrier Reef area.

### **Direct impacts**

The major direct impacts of the project that affect its suitability are those on:

- the regional, Queensland and national economies
- hydrology of groundwater and surface waters
- remnant terrestrial ecosystems
- the agricultural land use and productivity of the area.

The project is expected to contribute the export thermal coal industry for approximately 30 years, including by contributing to National and State income and providing both direct and indirect employment opportunities in the region. While a temporary loss of grazing land and a permanent loss of some land with cropping potential would result from the project, these impacts can be addressed through rehabilitation to restore suitability for grazing on some areas, in combination with the RIDA process under the RPI Act. Expected direct impacts on remnant terrestrial ecosystems, including listed species and communities, from site disturbance due to the project have been well characterised through the EIS assessment. Those impacts can be suitably addressed through offset requirements under Queensland law and the EPBC Act.

Some further measures that would contribute to suitable environmental outcomes with respect to direct project impacts are the:

- ability for outcome-based EA conditions to manage off-site discharges to water, air and noise so as to avoid or minimise environmental harm to sensitive receptors
- requirement for the design of the Sandy Creek and Bootes Creek diversions to maintain suitable hydraulic and ecological conditions
- opportunity for make good agreements to deal with any decline of groundwater bores on adjoining properties as a result of groundwater depressurisation.

### **Indirect impacts**

The project would also have a number of indirect impacts that affect its suitability. Social impacts are expected on the surrounding region, as a result of employment-related impacts and the shift in the community structure from an agriculture-based economy. However, these impacts essentially continue those currently associated with the RCM. While some submitters raised concerns about related impacts, it is noted both that significant economic and social dislocation are not predicted from the disruption of current land uses and that XCQ has maintained reasonable relationships with the local community during the operation of the RCM. Some dislocation is anticipated when mining ultimately ceases.

EHP agrees with the advice of the IESC that the project is unlikely to measurably contribute to deterioration of water quality in the Great Barrier Reef Marine Park or Shoalwater and Corio Bay Ramsar sites, and would have a negligible contribution to impacts on sediment loading on the reef. Consequently, those impacts do not affect the suitability of the project.

Greenhouse gas emissions associated with the transport and combustion of the extracted coal will contribute to global climate change. These emissions are not currently regulated under Queensland or Commonwealth legislation. and for this project annual mean emissions were noted for on-site and off-site including combustion of the coal (scope 3). The combined mean annual emissions equal 27,623,000 tonnes of CO<sub>2-e</sub>, which is in the order of 5% of Australia's annual scope 1 and 2 GHG emissions.

Other facilitated impacts associated with transport of coal from the project by rail and shipping, including through the GBRMP are predicted to be effectively addressed through existing relevant regulatory and management frameworks.

The key indirect impacts of the project that are relevant under Queensland legislation and the EPBC Act are the potential impacts on ecological and related environmental values from groundwater depressurisation and changes to surface flows and water quality.

A significant number of submissions, including from the public, were received on the EIS relating to potential environmental impacts of modelled hydrological changes. Those concerns were highlighted by submissions from the IESC and NPRSR.

EHP and DNRM are satisfied that the EIS provided a suitable assessment of direct hydrological impacts, including the implications of aquifer depressurisation for groundwater bores both during mining and in the longer-term.

While some changes were made to the EIS in response to submissions received on the EIS, a lack of clarity remained with respect to the potential ecological consequences of hydrological changes. EHP therefore sought further clarification from XCQ.

The EIS indicated that drawdown in the aquifers could indirectly affect 144 ha of GDEs outside the project footprint. However, XCQ has revised this estimate to exclude 22.8ha of GDEs located over basalt. The rationale provided is that the basalt aquifer is both confined by impermeable basalt flows and at a depth such that GDEs could not access the aquifer water. XCQ has also clarified its methodology for identifying GDEs over alluvium that could be affected by groundwater depressurisation, including a small 'at risk' GDE area within Albinia National Park.

While the investigation of aquatic and riparian ecology in the EIS relied on limited sampling, evidence from other regional studies supports a conclusion that the ecology of the ephemeral streams in the vicinity of the project is dominated by regeneration following high-flow events. Since the project is not expected to affect peak flows, ecological regeneration would not be significantly affected. The predicted reduction of baseflow in Meteor Creek is not expected to have a major impact on maintenance of ecological values in this watercourse, though some uncertainty remains around the conditions in the lower reaches including within Albinia National Park.

An uncertainty remains with respect to the potential consequences of discharges of mine-affected water on the aquatic and riparian ecology of Bootes Creek and Meteor Creek within Albinia National Park. While some relevant monitoring data has been acquired in recent years from the RCM, further evaluation is needed to establish appropriate discharge limits for the project.

### **Overall suitability**

In summary, the key impacts arising from the project that are relevant to approvals decision-making under Queensland legislation and the EPBC Act are:

- potential impacts on agricultural land and productivity, which would be addressed through the RIDA process
- the loss of vegetation and associated habitats through direct disturbance, which can be addressed through appropriate offsets in accordance with statutory requirements
- potential impacts on ecological values of watercourses and riparian GDEs due to the combined effects of groundwater drawdown in the alluvial aquifer, changes in baseflow, the Sandy Creek diversion (as a result of altered hydraulic conditions as well as the direct loss of habitat) and discharges of mine-affected water.

Although the RIDA process would determine the acceptability of the loss of agricultural values and appropriate mitigations, this assessment has concluded that the loss involved is unlikely to be so significant with respect to existing agricultural activities, potential values and regional implications to outweigh the economic value of the proposed expansion of the RCM.

While the ecological impacts from direct disturbance are not considered to be so significant to warrant avoidance by the project, the potential indirect impacts on Albinia National Park and the sections of Bootes Creek and Meteor Creek passing through it do warrant further investigation and appropriate mitigation to avoid impacts on their ecological values. Aspects of the standard criteria that are pertinent in this context are:

- the precautionary principle
- the principle of conservation of biological diversity and ecological integrity
- the EPP (Water), including the High Ecological Value area HEVa2124 identified in the document Comet River Sub-basin Environmental Values and Water Quality Objectives
- EPBC Act requirements for the protection of listed species and ecological communities and water resources
- the EIS and submitted advice on the EIS from parties including the IESC
- the public interest.

A combination of strategies would be needed to protect the important environmental values of Albinia National Park and the sections of Bootes Creek and Meteor Creek passing through it. It would be necessary to establish:


- a robust baseline assessment of environmental values potentially affected
- appropriate monitoring points for groundwater, surface water quality and flows, and ecological conditions
- appropriate WQO, as well as investigation and mitigation triggers, and discharge limits
- an accountable framework for adaptive responses to mitigate adverse hydrological changes, should they occur
- an appropriate program for managing run-off as well as mine discharges within the mine lease area, to both protect downstream values and contribute to environmental quality more generally
- upgrading of the EM plan to encompass these elements.

It is recommended that the program to address these strategies be agreed by EHP, QPWS, DNRM and DOE, and translated into appropriate approval conditions for the project, including as part of the EA. Amendments of the EM plan, and possibly of some EA conditions, may be needed as the above strategies are completed.

## 10 Report certification

The EIS process is complete when this EIS assessment report is approved by the delegate for the chief executive and given to Xstrata Coal Queensland Pty Ltd.

## 11 Approved by



Signature

Lindsay Delzoppo

**Director, Impact Assessment and Operational Support**

Delegate of the chief executive

Department of Environment and Heritage Protection

23 February 2015

Date

Enquiries: EIS Coordinator

Ph. (07) 3330 5596

Fax. (07) 3330 5754



# List of figures

Excerpts of figures from the EIS are reproduced in this assessment report.

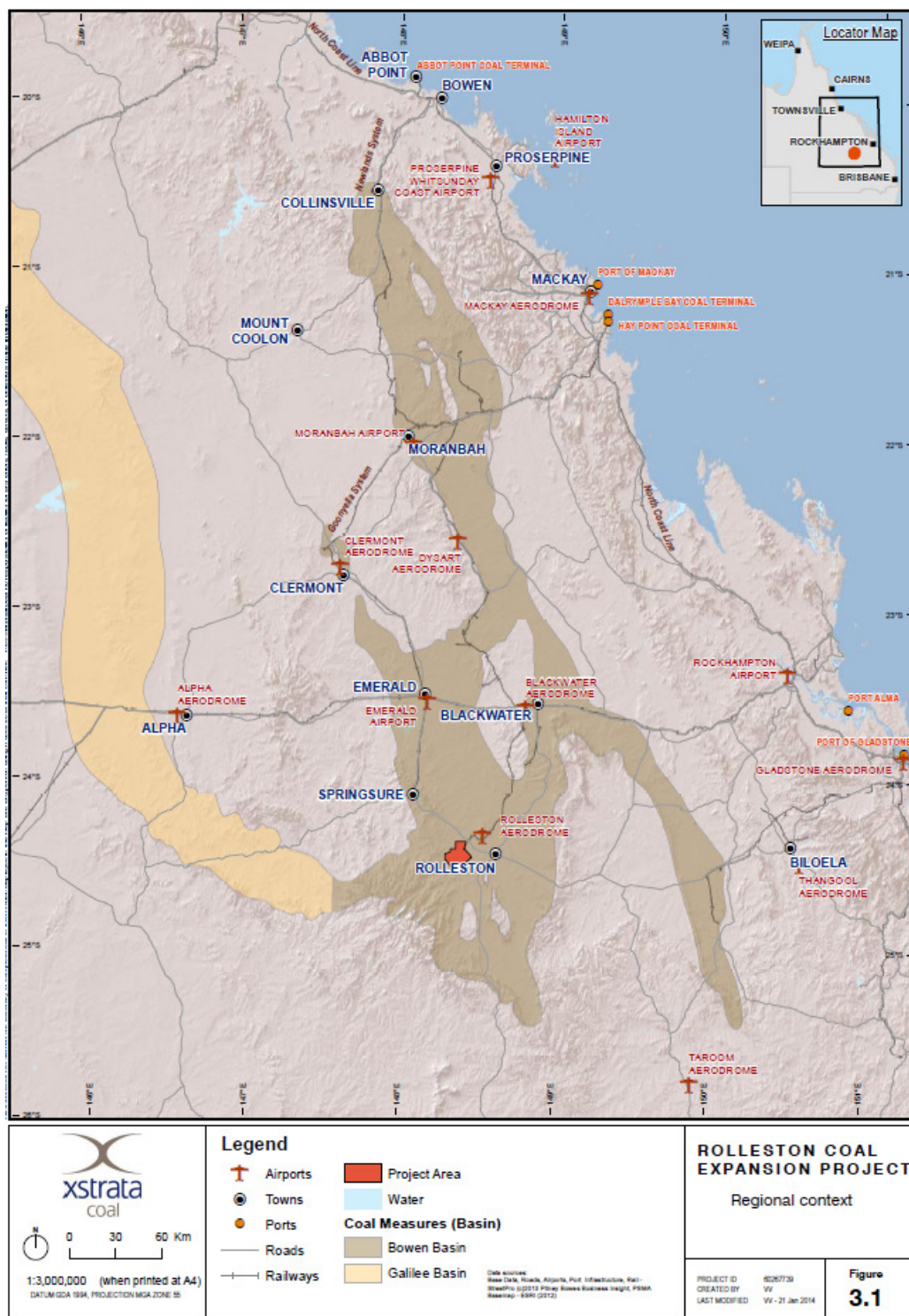
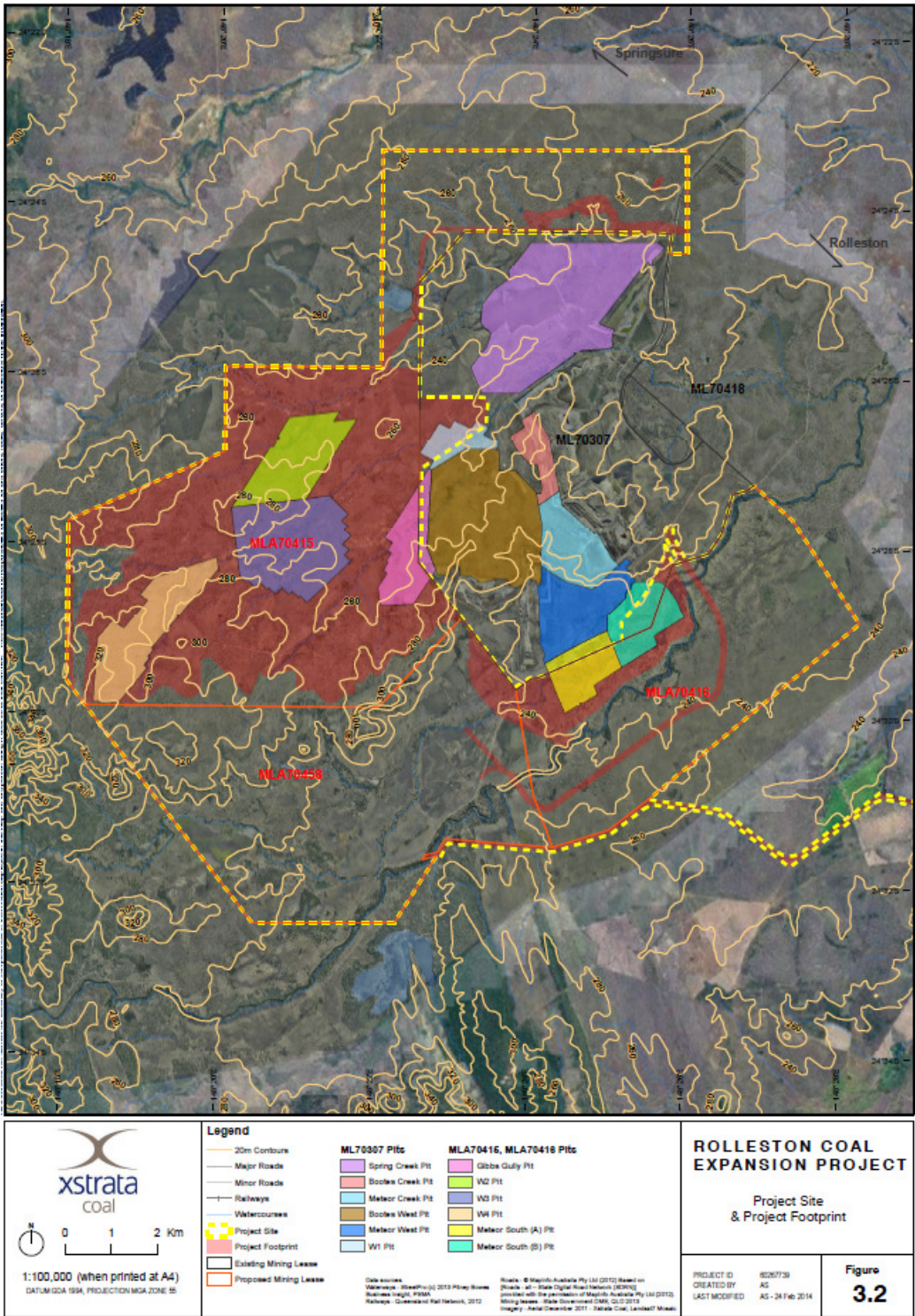


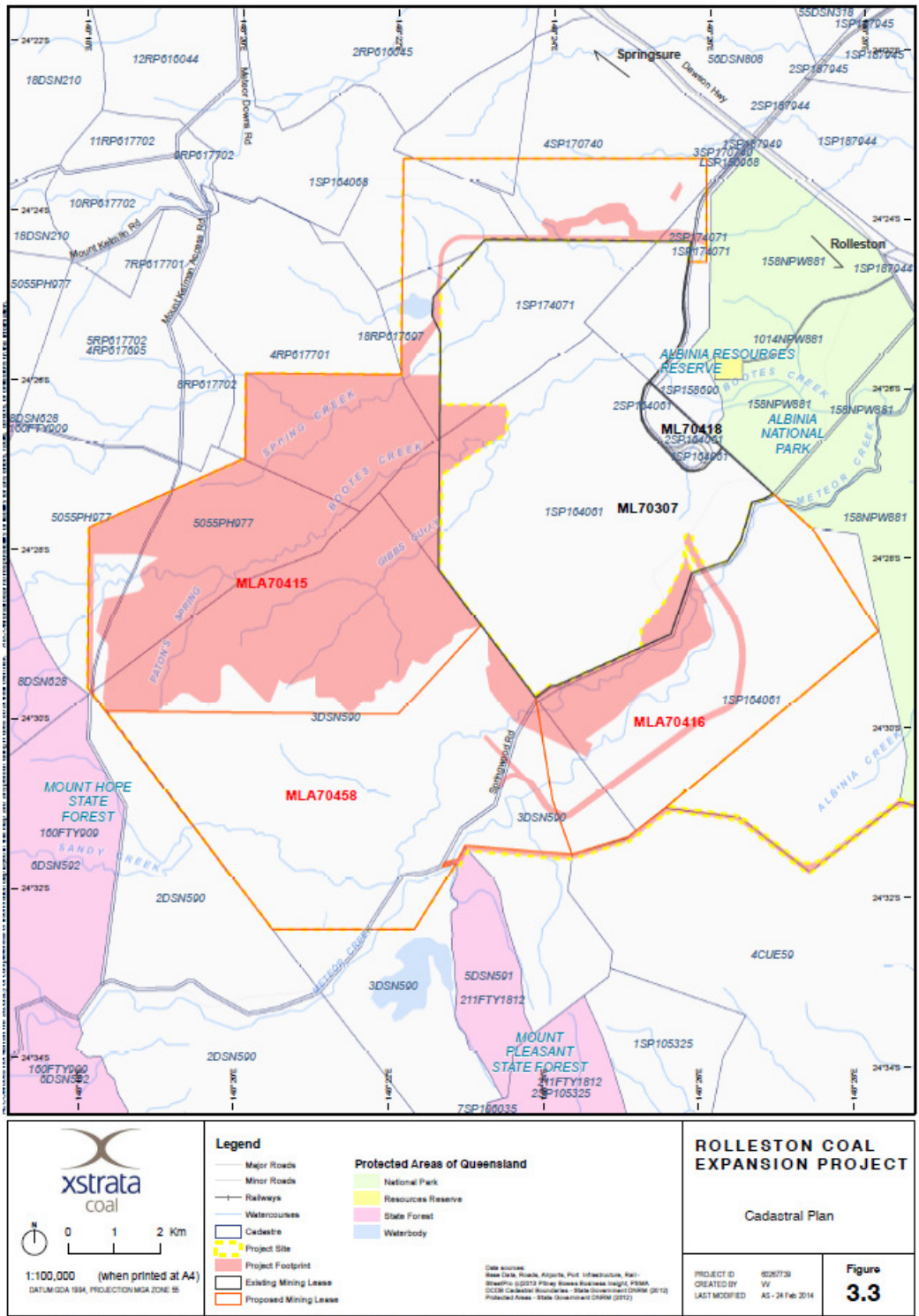
Figure 1 Rolleston Coal Expansion Project – Regional context

(Source: EIS Project description, Figure 3.1)



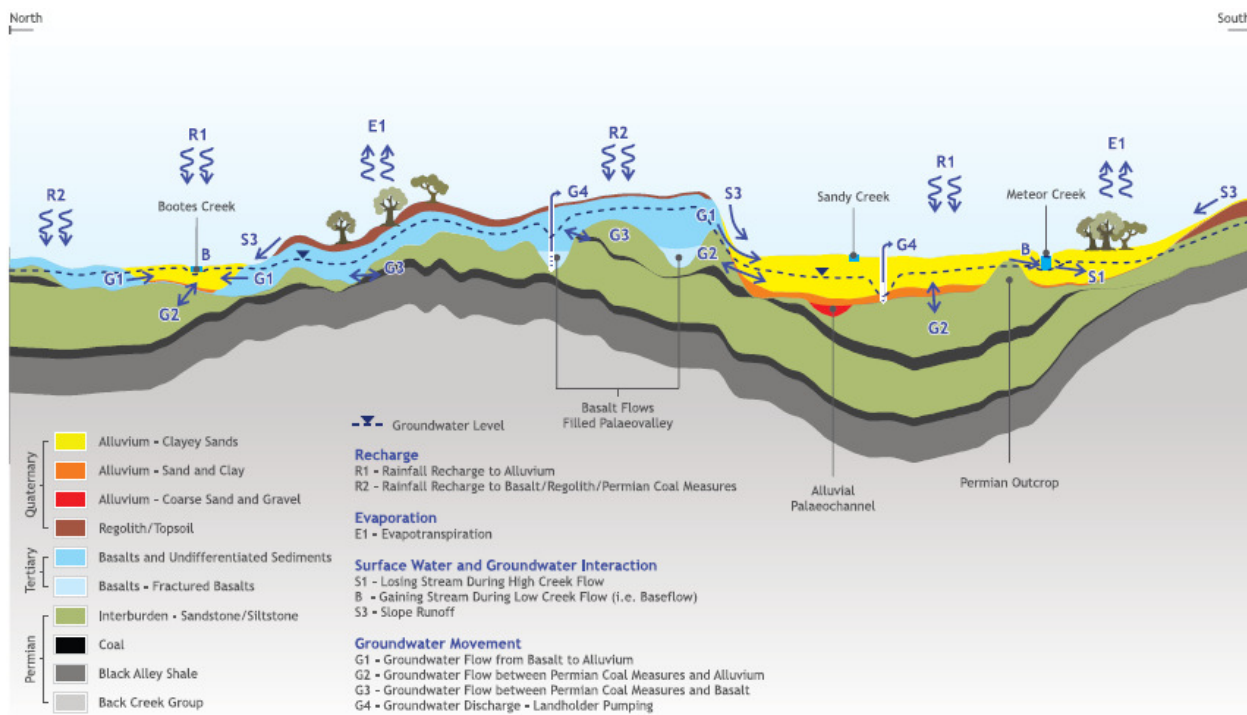
**Figure 2 Rolleston Coal Expansion Project – Project site and project footprint**

(Source: EIS Project description, Figure 3.2)

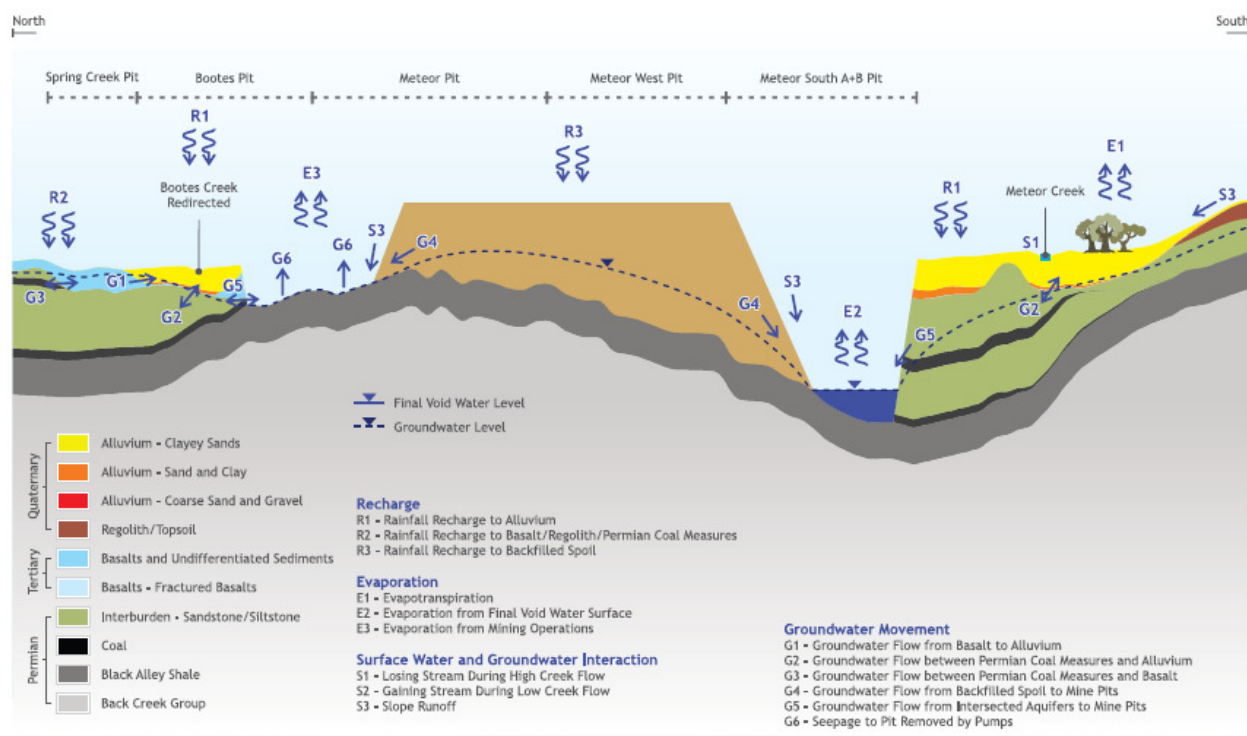


**Figure 3 Rolleston Coal Expansion Project – Cadastral plan**

(Source: EIS Project description, Figure 3.3)



**Figure 4** Conceptual Groundwater model cross section – pre-mining groundwater processes  
 (Source: EIS Appendix H-1, Groundwater impact assessment, Figure 31)



**Figure 5** Conceptual groundwater model cross section – Groundwater process during mining  
 (Source: EIS Appendix H-1, Groundwater impact assessment, Figure 32)

## List of acronyms and abbreviations

ABS	Australian Bureau Statistics
ACARP	Australian Coal Association Research Program
ACH Act	<i>Aboriginal and Cultural Heritage Act 2003</i>
AN	Ammonium nitrate
ANC	Acid Neutralising Capacity
AQMP	Air Quality Management Protocol
ARD	Acid Rock Drainage
ARI	Average recurrence interval
Audit	Queensland Agriculture Land Audit
BCM	Bank Cubic Metre
BoM	Bureau of Meteorology's
CHF	Coal Handling Facility
CHMP	Cultural Heritage Management Plan
CHRC	Central Highlands Regional Council
CMCP	Conceptual Mine Closure Plan
CRG	Community Reference Group
CO	Carbon monoxide
DATSIMA	Department of Aboriginal and Torres Strait Islander and Multicultural Affairs
DERM	Department of Environment and Resource Management
DIDO	Drive In Drive Out
DNRM	Department of Natural Resources and Mines
DOE	Commonwealth Department of the Environment
DTMR	Department of Transport and Main Roads
EA	Environmental authority
EHP	Department of Environment and Heritage Protection
EIS	Environmental impact statement
EM plan	Environmental management plan
EP Act	<i>Environmental Protection Act 1994</i>
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
<i>EPP</i>	<i>Exploration Permit for Petroleum</i>
EPP (Air)	Environmental Protection (Air) Policy 2008
EP Regulation	Environmental Protection Regulation 2008
ERA	Environmental relevant activities
ERM	Environmental Management Register
ESA	Environmentally standard axles
ESD	Ecological Sustainable Development
EVNT	Endangered, Vulnerable or Near Threatened
FIFO	Fly In Fly Out
FTE	Full Time Equivalent
GARID	Guidelines for Assessment of Road Impacts of Development

GHG	Greenhouse Gas
GL	Gigalitre
HHMP	Historical Heritage Management Plan
IAS	Initial advice statement
IESC	Independent Expert Scientific Committee
IPCC's	Intergovernmental Panel on Climate Change's
JORC	Joint Ore Reserves Committee
KM	Kilometres
KV	Kilovolt
LCT	Landscape Character Types
LTGA	Lock the Gate Alliance Inc
M	Metre
MDS	Meteor Downs South
MI	Megalitres
MIA	Mine infrastructure area
ML	Mining lease
MLA	Mining lease application
MNES	Matters of National Environmental Significance
MR Act	<i>Mineral Resources Act 1989</i>
MSA	Mine Service Area
Mt/yr	Million Tonnes per Year
MVA	Megavolt Ampere
NC Act	<i>Nature Conservation Act 1992</i>
NAF	Non-acid Forming
NEPM	National Environment Protection (Ambient Air Quality) Measures
NGER Act	<i>National Greenhouse &amp; Energy Reporting Act 2007</i>
NO	Nitric oxide
NO <sub>2</sub>	Nitrogen Dioxide
PAF	Potential Acid Forming
PALU	Priority Agricultural Land Use
PoG	Port of Gladstone
QAS	Queensland Ambulance Services
QFES	Queensland Fire and Emergency Services
QH Act	<i>Queensland Heritage Act 1992</i>
RCM	Rolleston Coal Mine
RGTCT	RD Tanna Coal Terminal
RIA	Road impact assessment
RIDA	Regional Interests Development Approval
RMP	Rehabilitation Management Plan
ROM	Run of Mine
RPI Act	<i>Regional Planning Interests Act 2014</i>

RUMP	Road Use Management Plan
SCA	Strategic Cropping Area
SCR	State-controlled Land
SEIFA	Social-Economic Indexes for Area
SEWPAC	Former Commonwealth Department of Sustainability, Environment, Water, Population and Communities
SIA	Social Impact Assessment
SIMP	Social Impact Management Plan
SLA	Statistical Local Area
SPP	State Planning Policy
SQEP	Suitably Qualified and Experienced Person
SQP	Suitably Qualified Person
STP	Sewage Treatment Plant
T	Tonnes
TEC	Threatened Ecological Community
TLO	Train Load Out
TMP	Traffic Management Plan
TO (RUM)	<i>Transport Operations (Road Use Management) Act 1995</i>
TOR	Terms of reference
TSP	Total Suspended Particulates
XCQ	Xstrata Coal Queensland
Water Act	<i>Water Act 2000</i>
WICET	Wiggins Island Coal Export Terminal
WMP	Water Management Plan

# Appendix A Recommended environmental authority conditions under the EP Act

## Environmental authority takes effect: XXXX

The anniversary date of this environmental authority is **31 December**. An annual return and the payment of the annual fee will be due each year on this day.

Environmental authority holder(s)

Name	Registered Address
Glencore Coal Queensland Pty Limited	Level 38, 1 Macquarie Place SYDNEY NSW 2000
ICRA Rolleston Pty Ltd	Level 15, Commonwealth Bank of Australia Building 240 Queen Street BRISBANE CITY QLD 4000
Sumisho Coal Australia Pty Limited	Level 34, Central Plaza One 345 Queen Street BRISBANE CITY QLD 4000

## Environmentally relevant activity and location details

Environmentally Relevant Activity(ies)	Location(s)
<p><i>Schedule 2 – Environmental Protection Regulation 2008</i></p> <p>ERA 8(3)(c) Chemical Storage Storing more than 500m<sup>3</sup> of chemicals of class C1 or C2 combustible liquids under AS 1940 or dangerous goods class 3 under subsection (1)(c).</p> <p>ERA 63(1) Sewage Treatment Operating sewage treatment works, other than no release works, with a total daily peak design capacity of more than 100 but not more than 1500EP.</p>	<p>ML70418</p> <p>ML70307</p> <p>MDL227</p> <p>MLA70458</p> <p>MLA70415</p> <p>MLA70416</p>
<p><i>Schedule 2A - Environmental Protection Regulation 2008</i></p> <p>ERA 13 Mining Black Coal</p>	

## Additional information for applicants

Environmentally relevant activities

The description of any environmentally relevant activity (ERA) for which an environmental authority is issued is a restatement of the ERA as defined by legislation at the time the approval is issued. Where there is any inconsistency between that description of an ERA and the conditions stated by an environmental authority as to the scale, intensity or manner of carrying out an ERA, then the conditions prevail to the extent of the inconsistency.

An environmental authority authorises the carrying out of an ERA and does not authorise any environmental harm unless a condition stated by the authority specifically authorises environmental harm.

A person carrying out an ERA must also be a registered suitable operator under the *Environmental Protection Act 1994* (EP Act).



## Contaminated land

It is a requirement of the EP Act that if an owner or occupier of land becomes aware a notifiable activity (as defined in Schedule 3 and Schedule 4) is being carried out on the land, or that the land has been, or is being, contaminated by a hazardous contaminant, the owner or occupier must, within 22 business days after becoming so aware, give written notice to the chief executive.

## Obligations under the *Environmental Protection Act 1994*

In addition to the requirements found in the conditions of this environmental authority, the holder must also meet their obligations under the EP Act, and the regulations made under the EP Act. For example, the holder must comply with the following provisions of the Act:

- general environmental duty (section 319)
- duty to notify environmental harm (section 320-320G)
- offence of causing serious or material environmental harm (sections 437-439)
- offence of causing environmental nuisance (section 440)
- offence of depositing prescribed water contaminants in waters and related matters (section 440ZG)
- offence to place contaminant where environmental harm or nuisance may be caused (section 443)

## Conditions of environmental authority

Schedule A - General	
Condition Number	Condition
A1	<p><b>Scope of Activity</b></p> <p>This environmental authority authorises the mining of up to <b>19 million tonnes</b> of run of mine (ROM) coal per annum.</p>
A2	<p>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.</p>
A3	<p>The holder of this environmental authority must:</p> <ol style="list-style-type: none"> <li>install all measures, plant and equipment necessary to ensure compliance with the conditions of this environmental authority;</li> <li>maintain such measures, plant and equipment in a proper and efficient condition;</li> <li>operate such measures, plant and equipment in a proper and efficient manner;</li> <li>ensure all instruments and devices used for the measurement or monitoring of any parameter under any condition of this environmental authority are properly calibrated.</li> </ol>
A4	<p>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.</p>
A5	<p><b>Financial assurance</b></p> <p>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.</p>
A6	<p>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 environmental authority is amended.</p>
A7	<p><b>Risk management</b></p> <p>The holder of this environmental authority must develop and implement a risk management system for</p>

	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.
<b>A8</b>	<p><b>Notification of emergencies, incidents and exceptions</b></p> <p>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.</p>
<b>A9</b>	<p>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:</p> <ul style="list-style-type: none"> <li>a) results and interpretation of any samples taken and analysed;</li> <li>b) outcomes of actions taken at the time to prevent or minimise unlawful environmental harm; and</li> <li>c) proposed actions to prevent a recurrence of the emergency or incident.</li> </ul>
<b>A10</b>	<p><b>Complaints</b></p> <p>The holder of this environmental authority must record all environmental complaints received about the mining activities including:</p> <ul style="list-style-type: none"> <li>a) name, address and contact number for of the complainant;</li> <li>b) time and date of complaint;</li> <li>c) reasons for the complaint;</li> <li>d) investigations undertaken;</li> <li>e) conclusions formed;</li> <li>f) actions taken to resolve the complaint;</li> <li>g) any abatement measures implemented; and</li> <li>h) person responsible for resolving the complaint.</li> </ul>
<b>A11</b>	<p>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.</p>
<b>A12</b>	<p><b>Third-party reporting</b></p> <p>The holder of this environmental authority must:</p> <ul style="list-style-type: none"> <li>a) within 1 year of the issue of this environmental authority, obtain a report on compliance with the conditions of this environmental authority from an appropriately qualified person;</li> <li>b) obtain further such reports at regular intervals, not exceeding 3 year intervals, from the completion of the report referred to above; and</li> <li>c) provide each report to the administering authority within 90 days of its completion.</li> </ul>
<b>A13</b>	<p>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:</p> <ul style="list-style-type: none"> <li>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</li> </ul>

	<p>structures referred to in <b>Schedule I</b>.</p> <p>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.</p>
--	---

<b>Schedule B - Air</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>B1</b>	<p><b>Dust nuisance</b></p> <p>The holder of this environmental authority 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 exceed the following levels when measured at any sensitive or commercial place:</p> <p>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.</p> <p>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:</p> <ol style="list-style-type: none"> <li>1. Australian Standard AS3580.9.6 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM<sub>10</sub> high volume sampler with size-selective inlet – Gravimetric method; or</li> <li>2. Australian Standard AS3580.9.9 Methods for sampling and analysis of ambient air—Determination of suspended particulate matter—PM<sub>10</sub> low volume sampler—Gravimetric method.</li> </ol>

<b>Schedule C - Noise and vibration</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>C1</b>	<p><b>Noise limits</b></p> <p>The holder of this environmental authority must ensure that noise generated from the mining activities must not cause the criteria in <b>Table C1 - Noise limits</b> to be exceeded at any sensitive or commercial place.</p>
<b>C2</b>	<p><b>Airblast overpressure nuisance</b></p> <p>The holder of this environmental authority must ensure that blasting does not cause the limits for peak particle velocity and airblast overpressure in <b>Table C2 - Blasting noise limits</b> to be exceeded at any sensitive or commercial place.</p>
<b>C3</b>	<p><b>Monitoring and reporting</b></p> <p>Noise monitoring and reporting must include the following matters:</p> <ol style="list-style-type: none"> <li>a) Leq (15mins);</li> <li>b) background noise;</li> </ol>

Schedule C - Noise and vibration	
Condition Number	Condition
	<ul style="list-style-type: none"> <li>c) the level and frequency of occurrence of impulsive or tonal noise;</li> <li>d) atmospheric conditions including wind speed and direction;</li> <li>e) effects due to extraneous factors such as traffic noise; and</li> <li>f) location date and time of recording.</li> </ul>

### Schedule C Tables

#### Table C1 - Noise limits

#### Table C2 - Blasting noise limits

Schedule D - Waste	
Condition Number	Condition
<b>D1</b>	All general and regulated waste must only be removed and transported from site by a person who has the authority to transport such wastes to a facility that is lawfully able to accept the waste under the <i>Environmental Protection Act 1994</i> .
<b>D2</b>	<p>A Waste Management Plan must be developed and implemented, and must include:</p> <ul style="list-style-type: none"> <li>a) a description of the mining activities that may generate waste;</li> <li>b) waste management control strategies such as: <ul style="list-style-type: none"> <li>i. the types and amounts of wastes generated by the mining activities.</li> <li>ii. segregation of the wastes.</li> <li>iii. storage of the wastes.</li> <li>iv. transport of wastes.</li> <li>v. monitoring and reporting matters concerning the wastes.</li> </ul> </li> <li>c) the hazardous characteristics of the wastes generated including disposal for hazardous wastes;</li> <li>d) a program for reusing, recycling or disposing of all wastes;</li> <li>e) how the waste will be dealt with in accordance with the waste management hierarchy, including a description of the types and amounts of waste that will be dealt with under each of the waste management practices in the waste management hierarchy (that is, avoidance, reuse, recycling, energy recovery and disposal);</li> <li>f) procedures for identifying and implementing opportunities to minimise the amount of waste generated, promote efficiency in the use of resources and improve the waste management practices employed;</li> <li>g) procedures for dealing with accidents, spills and other incidents;</li> <li>h) details of any accredited management system employed, or planned to be employed, to deal with waste;</li> <li>i) how often the performance of the Waste Management Plan will be assessed;</li> <li>j) the indicators or other criteria on which the performance of the Waste Management Plan will be assessed; and</li> <li>k) staff training and induction to the Waste Management Plan.</li> </ul>
<b>D3</b>	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.

<b>D4</b>	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.
<b>D5</b>	<b>Acid sulphate soils</b> Treat and manage acid sulphate soils in accordance with the latest edition of the Queensland Acid Sulphate Soil Technical Manual.

<b>Schedule E – Groundwater</b>	
<b>Condition number</b>	<b>Condition</b>
<b>E1</b>	The holder of this environmental authority must not release contaminants to groundwater.
<b>E2</b>	<b>Groundwater dependent ecosystems</b> The biocondition and extent of groundwater dependent ecosystems associated with the alluvium of Meteor Creek and Bootes Creek must remain unchanged. <i>Note: The biocondition must be determined by the methodology in BioCondition: a condition assessment framework for terrestrial biodiversity in Queensland: assessment manual. T.J. Eyre et. al. Version 2.2 (2015 or later versions).</i>
<b>E3</b>	<b>Monitoring and reporting</b> All determinations of groundwater quality and biological monitoring must be performed by an appropriately qualified person.
<b>E4</b>	The holder of the environmental authority must implement a groundwater monitoring program which has been developed by an appropriately qualified person. The program must be able to detect a significant change to groundwater quality values and standing water levels (consistent with the current suitability of the groundwater for domestic and agricultural use) due to activities that are part of this mining project.
<b>E5</b>	The holder of the environmental authority must report the results and analysis of groundwater monitoring to the administering authority on request.
<b>E6</b>	Groundwater affected by the mining activities must be monitored at compliance bores within the nominated geologies and minimum frequencies defined in <b>Table E1 – Groundwater monitoring locations and frequency</b> .
<b>E7</b>	<b>Exceedence investigation</b> If the groundwater quality triggers and levels defined in <b>Table E2 – Groundwater quality and level triggers</b> are exceeded then the environmental authority holder must complete an investigation into the potential for environmental harm and notify the administering authority within twenty-eight (28) days of receiving the results. An action plan to mitigate potential harm must be developed by a suitably qualified person.
<b>E8</b>	<b>Determining groundwater quality triggers</b> The background groundwater quality for each aquifer must be determined from hydraulically isolated background bore(s) that have not been affected by any mining activities. The groundwater quality triggers as per <b>Table E2 – Groundwater quality and level triggers</b> must be determined and submitted to the administering authority by 1 November 2015.

<b>E9</b>	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. Construction and decommissioning must be in accordance with the 'Minimum Construction Standard for Water Bores in Australia'.
<b>E10</b>	No impact to groundwater levels within the groundwater aquifers is to occur other than where authorised under an approval of the <i>Water Act 2000</i> .

### **Schedule E Tables**

**Table E1 - Groundwater monitoring locations and frequency**

**Table E2 - Groundwater quality and level triggers**

<b>Schedule F - Water</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>F1</b>	<b>Contaminant Release</b> 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.
<b>F2</b>	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 <b>Table F1 - Mine affected water release points, sources and receiving waters</b> and depicted in <b>Figure 2 - Mine affected water release points, monitoring locations and receiving waters</b> attached to this environmental authority.
<b>F3</b>	The release of mine affected water to internal water management infrastructure that is installed and operated in accordance with a water management plan that complies with condition <b>C27</b> is permitted.
<b>F4</b>	The release of mine affected water to waters in accordance with condition <b>F2</b> must not exceed the release limits stated in <b>Table F2 - Mine affected water release limits</b> when measured at the monitoring points specified in <b>Table F1 - Mine affected water release points, sources and receiving waters</b> for each quality characteristic.

<b>F5</b>	The release of mine affected water to waters from the release points must be monitored at the locations specified in <b>Table F1 - Mine affected water release points, sources and receiving waters</b> for each quality characteristic and at the frequency specified in <b>Table F2 - Mine affected water release limits</b> and <b>Table F3 - Release contaminant trigger investigation levels, potential contaminants</b> .  <i>Note: The administering authority will take into consideration any extenuating circumstances prior to determining an appropriate enforcement response in the event condition <b>F5</b> 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>
<b>F6</b>	If quality characteristics of the release exceed any of the trigger levels specified in <b>Table F3 - Release contaminant trigger investigation levels, potential contaminants</b> during a release event, the environmental authority holder must compare the downstream results in the receiving waters to

	<p>the trigger values specified in <b>Table F3 - Release contaminant trigger investigation levels, potential contaminants</b> and:</p> <p>a) where the trigger values are not exceeded then no action is to be taken; or</p> <p>b) where the downstream results exceed the trigger values specified <b>Table F3 - Release contaminant trigger investigation levels, potential contaminants</b> for any quality characteristic, compare the results of the downstream site to the data from background monitoring sites and:</p> <p>1. if the result is less than the background monitoring site data, then no action is to be taken; or</p> <p>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:</p> <p>(i) details of the investigations carried out; and</p> <p>(ii) actions taken to prevent environmental harm.</p> <p><i>Note: Where an exceedance of a trigger level has occurred and is being investigated, in accordance with <b>F6 (b) (2)</b> of this condition, no further reporting is required for subsequent trigger events for that quality characteristic.</i></p>
<b>F7</b>	If an exceedance in accordance with condition <b>F6 (b) (2)</b> is identified, the holder of the authority must notify the administering authority within <b>fourteen (14) days</b> of receiving the result.
<b>F8</b>	<p><b>Mine affected water release events</b></p> <p>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 <b>Table F4 - Mine affected water release during flow events</b>.</p>
<b>F9</b>	Notwithstanding any other condition of this environmental authority, the release of mine affected water to waters in accordance with condition <b>F2</b> must only take place during periods of natural flow in accordance with the receiving water flow criteria for discharge specified in <b>Table F4 - Mine affected water release during flow events</b> for the release point(s) specified in <b>Table F1 - Mine affected water release points, sources and receiving waters</b> .
<b>F10</b>	The release of mine affected water to waters in accordance with condition <b>F2</b> must not exceed the Maximum Release Rate (for all combined release point flows) for each receiving water flow criterion for discharge specified in <b>Table F4 - Mine affected water release during flow events</b> when measured at the monitoring points specified in <b>Table F1 - Mine affected water release points, sources and receiving waters</b> .
<b>F11</b>	The daily quantity of mine affected water release from each release point must be measured and recorded.
<b>F12</b>	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.
<b>F13</b>	<p><b>Notification of release event</b></p> <p>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:</p> <p>a) release commencement date/time;</p> <p>b) details regarding the compliance of the release with the conditions of Department Interest: Water of</p>

	<p>this environmental authority (that is, contaminant limits, natural flow, discharge volume);</p> <p>c) release point/s;</p> <p>d) release rate;</p> <p>e) release salinity; and</p> <p>f) receiving water/s including the natural flow rate.</p>
<b>F14</b>	<p>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 <b>F13</b> and within 28 days provide the following information in writing:</p> <p>a) release cessation date/time;</p> <p>b) natural flow rate in receiving water;</p> <p>c) volume of water released;</p> <p>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);</p> <p>e) all in-situ water quality monitoring results; and</p> <p>f) any other matters pertinent to the water release event.</p> <p><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 <b>F13</b> and <b>F14</b>, provided the relevant details of the release are included within the notification provided in accordance with conditions <b>F13</b> and <b>F14</b>.</i></p>
<b>F15</b>	<p><b>Notification of release event exceedance</b></p> <p>If the release limits defined in <b>Table F2 - Mine affected water release limits</b> are exceeded, the holder of the environmental authority must notify the administering authority in writing within 24 hours of receiving the results.</p>
<b>F16</b>	<p>The environmental authority holder must, within 28 days of a release that is not compliant with the conditions of this environmental authority, provide a report to the administering authority detailing:</p> <p>a) the reason for the release;</p> <p>b) the location of the release;</p> <p>c) the total volume of the release and which (if any) part of this volume was non-compliant;</p> <p>d) the total duration of the release and which (if any) part of this period was non-compliant;</p> <p>e) all water quality monitoring results (including all laboratory analyses);</p> <p>f) identification of any environmental harm as a result of the non-compliance;</p> <p>g) all calculations; and</p> <p>h) any other matters pertinent to the water release event.</p>
<b>F17</b>	<p><b>Receiving environment monitoring and contaminant trigger levels</b></p> <p>The quality of the receiving waters must be monitored at the locations specified in <b>Table F6 - Receiving water upstream background sites and downstream monitoring points</b> for each quality characteristic and at the monitoring frequency stated in <b>Table F5 - Receiving waters contaminant trigger levels</b>.</p>



<p><b>F18</b></p>	<p>If quality characteristics of the receiving water at the downstream monitoring points exceed any of the trigger levels specified in <b>Table F5 - Receiving waters contaminants trigger levels</b> during a release the environmental authority holder must compare the downstream results to the upstream results in the receiving waters and:</p> <ul style="list-style-type: none"> <li>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</li> <li>b) where the downstream results exceed the upstream results, provide the administering authority written notification within 24 hours of becoming aware of the exceedence and then complete an investigation into the potential for environmental harm and provide a written report to the administering authority within 20 business days of receiving the results, outlining: <ul style="list-style-type: none"> <li>1. details of the investigation carried out, and</li> <li>2. actions taken to prevent environmental harm.</li> </ul> </li> </ul> <p><i>Note: Where an exceedence of a trigger level has occurred and is being investigated, in accordance with <b>F18 (b)</b> of this condition, no further reporting is required for subsequent trigger events for that quality characteristics.</i></p>
<p><b>F19</b></p>	<p>All determinations of water quality and biological monitoring must be performed by an appropriately qualified person.</p>
<p><b>F20</b></p>	<p><b>Receiving Environment Monitoring Program (REMP)</b></p> <p>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.</p> <p>For the purposes of the REMP, the receiving environment is the waters of Bootes Creek and Meteor Creek and connected or surrounding waterways within 5km 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.</p>
<p><b>F21</b></p>	<p>A REMP must be maintained by a person possessing appropriate qualifications and experience in the field of hydrology and surface water monitoring program design.</p>
<p><b>F22</b></p>	<p>The REMP required by condition <b>F21</b> must address, but not be limited to, the following:</p> <ul style="list-style-type: none"> <li>a) a description of potentially affected receiving waters including key communities and background water quality characteristics based on accurate and reliable monitoring data that takes into consideration any temporal variation (e.g. seasonality);</li> <li>b) a description of applicable environmental values, including but not limited to: <ul style="list-style-type: none"> <li>i. hydrology (flow, duration, periodicity connectivity with groundwater systems);</li> <li>ii. physiochemical properties;</li> <li>iii. aquatic ecosystem parameters including flow and fauna habitat; and</li> <li>iv. geomorphological features;</li> </ul> </li> <li>c) a description of water quality objectives to be achieved (i.e. as scheduled pursuant to the <i>Environmental Protection (Water) Policy 2009</i>);</li> <li>d) any relevant reports prepared by other governmental or professional research organisations that relate to the receiving environment within which the REMP is proposed;</li> <li>e) water quality targets within the receiving environment to be achieved, and clarification of contaminant concentrations or levels indicating adverse environmental impacts during the REMP;</li> <li>f) monitoring for any potential and adverse environmental impacts caused by the release including impacts to bank stability and erosion;</li> <li>g) monitoring of stream flow hydrology;</li> <li>h) an assessment of bank stability and an evaluation of water course bank slumping;</li> <li>i) monitoring of physical and chemical parameters and dissolved oxygen saturation to assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC &amp;</li> </ul>

	<p>ARMCANZ 2000 guidelines;</p> <p>j) monitoring of contaminants should assess the extent of the compliance of concentrations with water quality objectives and/or the ANZECC &amp; ARMCANZ 2000 guidelines;</p> <p>k) monitoring of metals/metalloids in sediments with consideration of <i>ANZECC &amp; ARMCANZ 2000 guidelines</i>, <i>BATLEY</i> and the most recent version of <i>AS5667.4 Guidance on Sampling of Bottom Sediments</i>;</p> <p>l) monitoring biological indicators (including but not limited to vertebrate and invertebrate species) for permanent, semi-permanent water holes and water storages using sampling techniques sufficient to reliably detect significant differences between impacts (test) and un-impacted sites;</p> <p>m) monitoring of a selection of zooplankton species to assess health (e.g. exoskeleton density) in respect to the availability of calcium and magnesium;</p> <p>n) the methods for analysis and interpretation of all monitoring results;</p> <p>o) the locations of monitoring points (including the locations of proposed background and downstream impacted sites for each release point);</p> <p>p) the frequency of scheduling of sampling and analysis sufficient to determine water quality objectives and to derive site specific reference values within two (2) years (depending on wet season flows) in accordance with the <i>Queensland Water Quality Guidelines 2009</i>. For ephemeral streams, this should include periods of flow irrespective of mine or other discharges;</p> <p>q) specify sampling and analysis methods and quality assurance and control;</p> <p>r) any historical data sets to be relied upon;</p> <p>s) description of the statistical basis on which conclusions are drawn;</p> <p>t) any control or reference sites; and</p> <p>u) record of planned and unplanned releases to watercourses, procedures for event monitoring, monitoring methodology used and procedure to establish background surface water quality.</p>
<b>F23</b>	<p>A report outlining the findings of the REMP, including all monitoring results and interpretations must be prepared annually and submitted 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.</p>
<b>F24</b>	<p><b>Water reuse</b></p> <p>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).</p>
<b>F25</b>	<p><b>Annual water monitoring reporting</b></p> <p>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:</p> <p>a) the date on which the sample was taken;</p> <p>b) the time at which the sample was taken;</p> <p>c) the monitoring point at which the sample was taken;</p> <p>d) the measured or estimated daily quantity of mine affected water released from all release points;</p> <p>e) the release flow rate at the time of sampling for each release point;</p> <p>f) the results of all monitoring and details of any exceedances of the conditions of this environmental authority; and</p> <p>g) water quality monitoring data must be provided to the administering authority in the specified electronic format upon request.</p>

<b>F26</b>	<b>Temporary interference with waterways</b> 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> .
<b>F27</b>	<b>Water management plan</b> A Water Management Plan must be developed by an appropriately qualified person and implemented.
<b>F28</b>	A Water Management Plan must provide for effective management of actual and potential environmental impacts resulting from water management associated with the mining activity carried out under this environmental authority, and must include: <ul style="list-style-type: none"> <li>a) a study of the source of contaminants;</li> <li>b) a water balance model for the site;</li> <li>c) a water management system for the site;</li> <li>d) measures to manage and prevent saline drainage;</li> <li>e) measures to manage and prevent acid rock drainage;</li> <li>f) contingency procedures for emergencies; and</li> <li>g) a program for monitoring and review of the effectiveness of the water management plan.</li> </ul>
<b>F29</b>	<b>Stormwater and water sediment controls</b> 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.
<b>F30</b>	Stormwater, other than mine affected water, is permitted to be released to waters from: <ul style="list-style-type: none"> <li>a) erosion and sediment control structures that are installed and operated in accordance with the Erosion and Sediment Control Plan required by condition <b>F29</b>; and</li> <li>b) water management infrastructure that is installed and operated, in accordance with a Water Management Plan that complies with condition <b>F28</b>, for the purpose of ensuring water does not become mine affected water.</li> </ul>

#### **Schedule F Tables**

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

**Table F2 - Mine affected water release limits**

**Table F3 - Release contaminant trigger investigation levels**

**Table F4 - Mine affected water release during flow events**

**Table F5 - Receiving waters contaminant trigger levels**

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

<b>Schedule G – Sewage treatment</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>G1</b>	Treated sewage effluent must only be released to land in compliance with the release limits stated in <b>Table G1 - Contaminant release limits to land</b> .
<b>G2</b>	Treated sewage effluent may only be released to land in accordance with the conditions of this approval at the following locations:

Schedule G – Sewage treatment	
Condition Number	Condition
	(a) within the nominated irrigation area(s) identified in the Plan of Operations; and (b) other land for beneficial reuse for the purpose of dust suppression and/or firefighting.
<b>G3</b>	The application of treated effluent to land must be carried out in a manner such that: a) the quality of groundwater is not adversely affected; b) vegetation is not damaged; c) soil erosion and degradation of the soil structure is minimised; d) spray drift or overspray does not carry beyond irrigation areas; e) there is no surface ponding of effluent; f) there is no run-off of effluent; and g) sufficient buffer zones are maintained between irrigation sites and other environmental values.
<b>G4</b>	If areas irrigated with effluent are accessible to employees or the general public, prominent signage must be provided advising that effluent is present and care should be taken to avoid consuming or otherwise coming into unprotected contact with the effluent.
<b>G5</b>	All sewage effluent released to land must be monitored at the frequency and for the parameters specified in <b>Table G1 - Contaminant release limits to land</b> .
<b>G6</b>	The daily volume of effluent release to land must be measured and records kept of the volumes of effluent released.
<b>G7</b>	When circumstances prevent the irrigation or beneficial reuse of treated sewage effluent such as during or following rain events, treated sewage effluent must be directed to the Pit Water Dam or alternative measures must be taken to store/lawfully dispose of effluent.
<b>G8</b>	The minimum area of land used for irrigation, excluding any necessary buffer zones, must be based on a determination of the capacity of the land to assimilate nitrogen, phosphorus, salts and organic matter.
<b>G9</b>	Treated sewage effluent must only be supplied to another person or organisation that has a written plan detailing how the user of the treated sewage effluent will comply with their general environmental duty under section 319 of the Act whilst using the treated sewage effluent.

### **Schedule G Tables**

**Table G1 – Contaminant release limits to land**

Schedule H – Watercourse diversions	
Condition Number	Condition
<b>H1</b>	<b>Permanent watercourse diversions</b> Permanent watercourse diversions, or the re-establishment of a pre-existing watercourse where a temporary watercourse diversion is being replaced, must be designed and constructed to: a) incorporate natural features (including geomorphic and vegetation) present at the location of the diversion; b) maintain the pre-existing hydrologic characteristics of surface water and groundwater systems for

	<p>the area in which the watercourse diversion is located;</p> <p>c) maintain the hydraulic characteristics of the permanent watercourse diversion that are equivalent to other local watercourses and are suitable for the area in which the diversion is located without using artificial structures that require on-going maintenance;</p> <p>d) maintain sediment transport and water quality regimes that allow the diversion to be self-sustaining, while minimising any impacts to upstream and downstream water quality, geomorphology or vegetation; and</p> <p>e) maintain equilibrium and functionality in all substrate conditions at the location of the diversion.</p>
<b>H2</b>	<p><b>Temporary watercourse diversions</b></p> <p>Temporary watercourse diversions must be designed and constructed to:</p> <p>a) maintain the pre-existing hydrologic characteristics of surface water systems for the area in which the watercourse diversion is located;</p> <p>b) maintain the hydraulic characteristics of the watercourse diversion that are equivalent to other local watercourses and are suitable for the area in which the diversion is located. Where structures that require on-going maintenance are used, they must not compromise the equilibrium and performance of the temporary watercourse diversion and adjoining watercourses;</p> <p>c) maintain sediment transport and water quality regimes that minimise any impacts to upstream and downstream water quality, geomorphology or vegetation; and</p> <p>d) maintain equilibrium and functionality at all substrate conditions at the location of the diversion.</p>
<b>H3</b>	<p><b>Design plan – all diversions</b></p> <p>A certified Design Plan that achieves condition <b>H1</b> for permanent watercourse diversions and condition <b>H2</b> for temporary watercourse diversions must be submitted to the administering authority at least 10 business days before commencing construction of the diversion.</p>
<b>H4</b>	<p>The certified design plan for any temporary or permanent watercourse diversion must be consistent with the functional design/s that formed a part of the application documents for this authority.</p>
<b>H5</b>	<p><b>Construction and operation – all diversions</b></p> <p>A certified set of 'as constructed' drawings and specifications must be submitted to the administering authority within 60 business days from the completion of construction of the temporary or permanent watercourse diversion, or re-establishment of the pre-existing watercourse. These drawings and specifications must state:</p> <p>a) that the 'as constructed' drawings and specifications meet the original intent of the design plan for the watercourse diversion; and</p> <p>b) construction of the watercourse diversion is in accordance with the design plan.</p>
<b>H6</b>	<p><b>Register – all diversions</b></p> <p>The details of watercourse diversions planned and constructed under an environmental authority must be accurately recorded on the Register of Watercourse Diversions kept by the holder of the authority. An electronic copy must be provided to the administering authority on request.</p>

<b>Schedule I – Regulated structures</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>I1</b>	<p><b>Assessment of consequence category</b></p> <p>The consequence category of any structure must be assessed by a suitably qualified and experienced person in accordance with the <i>Manual for Assessing Consequence Categories and Hydraulic Performance of Structures</i> (EM635) at the following times:</p> <p>a) prior to the design and construction of the structure, if it not an existing structure; or</p> <p>b) if it is an existing structure, prior to the adoption of this schedule; or</p>

	<p>c) prior to any change in its purpose or the nature of its stored contents; and</p> <p>d) following any change in surroundings or in the conditions downstream.</p>
<b>I2</b>	A consequence assessment report and certification must be prepared for each structure assessed and the report may include a consequence assessment for more than one structure.
<b>I3</b>	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 Consequence Categories and Hydraulic Performance of Structures</i> (EM635).
<b>I4</b>	<p><b>Design and construction of a regulated structure</b></p> <p>Conditions <b>I5</b> to <b>I9</b> inclusive do not apply to existing structures.</p>
<b>I5</b>	<p>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 Consequence Categories and Hydraulic Performance of Structures</i> (EM635).</p> <p><i>Note: Construction of a dam includes modification of an existing dam. Certification of design and construction may be undertaken by different persons.</i></p>
<b>I6</b>	Construction of a regulated structure is prohibited unless the holder has submitted a consequence category assessment report and certification to the administering authority that has been certified by 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.
<b>I7</b>	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 Consequence Categories and Hydraulic Performance of Structures</i> (EM635), and must be recorded in the Register of Regulated Structures.
<b>I8</b>	<p>Regulated structures must:</p> <p>a) be designed and constructed in accordance with and conform to the requirements of the <i>Manual for Assessing Consequence Categories and Hydraulic Performance of Structures</i> (EM635);</p> <p>b) be designed and constructed with due consideration given to ensuring that the design integrity would not be compromised on account of:</p> <p>i) floodwaters from entering the regulated dam from any watercourse or drainage line; and</p> <p>ii) wall failure due to erosion by floodwaters arising from any watercourse or drainage line.</p> <p>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.</p>
<b>I9</b>	<p>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:</p> <p>a) the 'as constructed' drawings and specifications meet the original intent of the design plan for that regulated structure;</p> <p>b) construction of the regulated structure is in accordance with the design plan.</p>
<b>I10</b>	<p><b>Operation of a regulated structure</b></p> <p>Operation of a regulated structure, except for an existing structure, is prohibited unless:</p> <p>a) the holder has submitted to the administering authority:</p>

	<p>i) one paper copy and one electronic copy of the design plan and certification of the 'design plan' in accordance with condition <b>I7</b>;</p> <p>ii) a set of 'as constructed' drawings and specifications;</p> <p>iii) certification of those 'as constructed drawings and specifications' in accordance with condition <b>I9</b>;</p> <p>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;</p> <p>v) the requirements of this authority relating to the construction of the regulated structure have been met;</p> <p>vi) the holder has entered the details required under this authority into a Register of Regulated Dams; and</p> <p>vii) there is a current operational plan for the regulated structures.</p>
<b>I11</b>	<p>For existing structures that are regulated structures:</p> <p>a) where the existing structure that is a regulated structure is to be managed as part of an integrated containment system for the purpose of sharing the DSA volume across the system, the holder must submit to the administering authority within 12 months of the commencement of this condition a copy of the certified system design plan including that structure; and</p> <p>b) There must be a current operational plan for the existing structures.</p>
<b>I12</b>	Each regulated structure must be maintained and operated, for the duration of its operational life until decommissioned and rehabilitated, in a manner that is consistent with the current operational plan, and if applicable, the current design plan and associated certified 'as constructed' drawings.
<b>I13</b>	<p><b>Mandatory reporting level</b></p> <p>Conditions <b>I14</b> to <b>I17</b> inclusive only apply to Regulated Structures which have not been certified as low consequence category for 'failure to contain – overtopping'.</p>
<b>I14</b>	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.
<b>I15</b>	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.
<b>I16</b>	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.
<b>I17</b>	The holder must record any changes to the MRL in the Register of Regulated Structures.
<b>I18</b>	<p><b>Design storage allowance</b></p> <p>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.</p>
<b>I19</b>	By 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).
<b>I20</b>	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.
<b>I21</b>	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.

I22	<p><b>Annual inspection report</b></p> <p>Each regulated structure must be inspected each calendar year by a suitably qualified and experienced person.</p>
I23	<p>At each annual inspection, the condition and adequacy of all components of the regulated structure must be assessed and a suitably qualified and experienced person must prepare an annual inspection report containing details of the assessment and include recommended actions to ensure the integrity of the regulated structure.</p>
I24	<p>The suitably qualified and experienced person who prepared the annual inspection report must certify the report in accordance with the <i>Manual for Assessing Consequence Categories and Hydraulic Performance of Structures</i> (EM635).</p>
I25	<p>The holder must:</p> <ul style="list-style-type: none"> <li>a) Within 20 business days of receipt of the annual inspection report, provide to the administering authority: <ul style="list-style-type: none"> <li>i) the recommendations section of the annual inspection report; and</li> <li>ii) if applicable, any actions being taken in response to those recommendations; and</li> </ul> </li> <li>b) if, following receipt of the recommendations and (if applicable) actions, the administering authority requests a full copy of the annual inspection report from the holder, provide this to the administering authority within 10 business days of receipt of the request.</li> </ul>
I26	<p><b>Transfer arrangements</b></p> <p>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, consequence assessment, design plan and other supporting documentation, to a new holder on transfer of this authority.</p>
I27	<p><b>Decommissioning and rehabilitation</b></p> <p>Dams must not be abandoned but be either:</p> <ul style="list-style-type: none"> <li>a) decommissioned and rehabilitated to achieve compliance with condition <b>I28</b>; or</li> <li>b) be left in-situ for a beneficial use(s) provided that: <ul style="list-style-type: none"> <li>i) it no longer contains contaminants that will migrate into the environment;</li> <li>ii) it contains water of a quality that is demonstrated to be suitable for its intended beneficial use(s); and</li> <li>iii) the administering authority, the holder of the environmental authority and the landholder agree in writing that the dam will be used by the landholder following the cessation of the environmentally relevant activity(ies).</li> </ul> </li> </ul>
I28	<p>After decommissioning, all significantly disturbed land caused by the carrying out of the environmentally relevant activity(ies) must be rehabilitated to meet the following final acceptance criteria:</p> <ul style="list-style-type: none"> <li>a) the landform is safe for humans and fauna;</li> <li>b) the landform is stable with no subsidence or erosion gullies for at least three (3) years;</li> <li>c) any contaminated land (e.g. contaminated soils) is remediated and rehabilitated;</li> <li>d) not allowing for acid mine drainage; or</li> <li>e) there is no ongoing contamination to waters (including groundwater);</li> <li>f) rehabilitation is undertaken in a manner such that any actual or potential acid sulphate soils on the area of significant disturbance are treated to prevent or minimise environmental harm in accordance with the Instructions for the treatment and management of acid sulphate soils (2001);</li> </ul>



	<p>g) all significantly disturbed land is reinstated to the pre-disturbed soil suitability class;</p> <p>h) for land that is not being cultivated by the landholder:</p> <p>a. groundcover, that is not a declared pest species is established and self-sustaining</p> <p>b. vegetation of similar species richness and species diversity to pre-selected analogue sites is established and self-sustaining, and</p> <p>c. the maintenance requirements for rehabilitated land is no greater than that required for the land prior to its disturbance caused by carrying out the mining activity(ies).</p> <p>i) for land that is to be cultivated by the landholder, cover crop is revegetated, unless the landholder will be preparing the site for cropping within 3 months of petroleum activities being completed.</p>
<b>I29</b>	<p><b>Register of regulated structures</b></p> <p>A Register of Regulated Structures must be established and maintained by the holder for each regulated structure.</p>
<b>I30</b>	The holder must provisionally enter the required information in the Register of Regulated Structures when a design plan for a regulated dam is submitted to the administering authority.
<b>I31</b>	The holder must make a final entry of the required information in the Register of Regulated Structures once compliance with condition <b>I10</b> has been achieved.
<b>I32</b>	The holder must ensure that the information contained in the Register of Regulated Structures is current and complete on any given day.
<b>I33</b>	All entries in the Register of Regulated Structures must be approved by the chief executive officer for the holder of this authority, or their delegate, as being accurate and correct.
<b>I34</b>	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 Structures, in the electronic format required by the administering authority.
<b>I35</b>	<p><b>Transitional arrangements</b></p> <p>All existing structures that have not been assessed in accordance with either the Manual or the former Manual for Assessing Hazard Categories and Hydraulic Performance of Dams must be assessed and certified in accordance with the Manual within 6 months of amendment of the authority adopting this schedule.</p>
<b>I36</b>	All existing structures must subsequently comply with the timetable for any further assessments in accordance with the Manual specified in <b>Table I1 - Transitional requirements for existing structures</b> , depending on the consequence category for each existing structure assessed in the most recent previous certification for that structure.
<b>I37</b>	<p><b>Table I1 - Transitional requirements for existing structures</b> ceases to apply for a structure once any of the following events has occurred:</p> <p>a) It has been brought into compliance with the hydraulic performance criteria applicable to the structure under the Manual; or</p> <p>b) It has been decommissioned; or</p> <p>c) It has been certified as no longer being assessed as a regulated structure.</p>
<b>I38</b>	Certification of the transitional assessment required by <b>I35</b> and <b>I36</b> (as applicable) must be provided to the administering authority within 6 months of amendment of the authority adopting this schedule.

**Table I1 - Transitional hydraulic performance requirements for existing structures**

<b>Transition period required for existing structures to achieve the requirements of the <i>Manual for Assessing Consequence Categories and Hydraulic Performance of Structures</i></b>			
<b>Compliance with criteria</b>	<b>High</b>	<b>Significant</b>	<b>Low</b>
>90% and a history of good compliance performance in last 5 years	No transition required	No transition required	No transitional conditions apply. Review consequence assessment every 7 years.
>70%-≤90%	Within 7 years, unless otherwise agreed with the administering authority, based on no history of unauthorised releases.	Within 10 years, unless otherwise agreed with the administering authority, based on no history of unauthorised releases.	No transitional conditions apply. Review consequence assessment every 7 years.
>50-≤70%	Within 5 years unless otherwise agreed with the administering authority, based on no history of unauthorised releases.	Within 7 years unless otherwise agreed with the administering authority, based on no history of unauthorised releases.	Review consequence assessment every 7 years.
≤50%	Within 5 years or as per compliance requirements (e.g. TEP timing)	Within 5 years or as per compliance requirements (e.g. TEP timing)	Review consequence assessment every 5 years.

<b>Schedule J – Land and rehabilitation</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>J1</b>	Contaminants must not be released to land unless otherwise permitted under the conditions of this authority.
<b>J2</b>	<b>Topsoil</b> Topsoil must be strategically stripped ahead of mining in accordance with a topsoil management plan.
<b>J3</b>	A topsoil inventory which identifies the topsoil requirements and availability of suitable topsoil on site must be detailed in the current plan of operations.

<b>J4</b>	<p>The Topsoil Management Plan must include the following:</p> <ul style="list-style-type: none"> <li>a) prior to disturbance, all topsoil resources will be mapped and assessed by suitably qualified persons who will recommend topsoil stripping depths and management requirements for each soil types;</li> <li>b) soils will be salvaged for rehabilitation with topsoil stripping and management undertaken in accordance with the above recommendations;</li> <li>c) topsoil stockpiles to be mapped and volumes recorded;</li> <li>d) where topsoil is being stripped within an economic (scraper haulage) distance of a prepared rehabilitation area, topsoil will be directly placed on the rehabilitation area without stockpiling. Where this is not feasible, topsoil stockpiles will be constructed;</li> <li>e) the height of topsoil stockpiles will be minimised where possible given operational constraints;</li> <li>f) topsoil stockpiles will be left to self-revegetate. If after one or more wet seasons an unacceptable grass cover has established on the topsoil dump, the surface will be prepared and sown with pasture grasses; and</li> <li>g) topsoil replacement on reshaped spoil areas will be to a minimum depth of 150mm.</li> </ul>
<b>J5</b>	<p><b>Rehabilitation</b></p> <p>All areas significantly disturbed by mining activities must be rehabilitated in accordance with the Rehabilitation Management Plan to achieve the following rehabilitation goals:</p> <ul style="list-style-type: none"> <li>a) safe to humans and wildlife;</li> <li>b) stable;</li> <li>c) non-polluting; and</li> <li>d) self-sustaining for the post-mining land use.</li> </ul>
<b>J6</b>	<p>The Rehabilitation Management Plan must be developed by an appropriately qualified person and implemented, and must include:</p> <ul style="list-style-type: none"> <li>a) rehabilitation objectives to achieve the rehabilitation goals for all disturbed areas;</li> <li>b) detailed rehabilitation methods for each disturbed area;</li> <li>c) rehabilitation indicators to measure the success of the rehabilitation against the rehabilitation objectives;</li> <li>d) final completion criteria that will achieve the rehabilitation goals and objectives;</li> <li>e) landform design criteria;</li> <li>f) details of the rehabilitation trial being undertaken on ML70307 including an investigation into its effectiveness; and</li> <li>g) details of appropriate monitoring and maintenance of rehabilitation.</li> </ul>
<b>J7</b>	<p>The Rehabilitation Management Plan must be made available to the administering authority on request.</p>
<b>J8</b>	<p>Progressive rehabilitation must commence within two (2) years of areas becoming available within the operational land and be reflected in the plan of operations.</p>

<b>J9</b>	<p><b>Residual voids</b></p> <p>Residual voids must not cause any material or serious environmental harm to land, surface waters or any recognised groundwater aquifer, other than the environmental harm constituted by the existence of the residual void itself and authorised by this environmental authority.</p>
<b>J10</b>	<p>Complete an investigation into residual voids and submit a report to the administering authority proposing completion criteria to meet the rehabilitation objectives in <b>J5</b> by 30 January 2016.</p> <p>The investigation must at a minimum include the following:</p> <ul style="list-style-type: none"> <li>a) a study of options available for minimising final void area and volume;</li> </ul>

	<ul style="list-style-type: none"> <li>b) develop design criteria for rehabilitation of final voids;</li> <li>c) a void hydrology study, addressing the long-term water balance in the voids, connections to groundwater resources and water quality parameters in the long term;</li> <li>d) a pit wall stability study, considering the effects of long-term erosion and weathering of the pit wall and the effects of significant hydrological events;</li> <li>e) a study of void capability to support native flora and fauna; and</li> <li>f) a proposal/s for end of mine void rehabilitation success criteria and final void areas and volumes.</li> </ul>
<b>J11</b>	<p><b>Post closure</b></p> <p>A Post Closure Management Plan for the site must be developed by an appropriately qualified person and submitted to the administering authority for approval at least eighteen (18) months prior to the finalisation of coal mining on site and implemented for a nominal period of:</p> <ul style="list-style-type: none"> <li>a) at least thirty (30) years following the finalisation of coal mining on site; or</li> <li>b) a shorter period if the site is proven to be geotechnically and geochemically stable and it can be demonstrated to the satisfaction of the administering authority that no release of contaminants from the site will result in environmental harm.</li> </ul>
<b>J12</b>	<p>The Post Closure Management Plan must include the operation, monitoring and maintenance of the following:</p> <ul style="list-style-type: none"> <li>a) wastewater collection and reticulation systems;</li> <li>b) wastewater treatment systems;</li> <li>c) groundwater quality monitoring network;</li> <li>d) surface water quality;</li> <li>e) groundwater quality;</li> <li>f) seepage rates;</li> <li>g) erosion rates;</li> <li>h) integrity and stability of slopes, ramps and voids; and</li> <li>i) the health and resilience of vegetation cover.</li> </ul>
<b>J13</b>	<p><b>Acid mine drainage and leachate management</b></p> <p>All reasonable and practicable measures must be implemented to prevent hazardous leachate being directly or indirectly released or likely to be released as a result of the activity to the environment.</p>
<b>J14</b>	<p><b>Waste rock</b></p> <p>A waste rock and spoil disposal plan should be developed and implemented and include, where relevant, at least:</p> <ul style="list-style-type: none"> <li>a) effective characterisation of the waste rock and spoil to predict under the proposed placement and disposal strategy the quality of runoff and seepage generated concerning potentially environmentally significant effects including salinity, acidity, alkalinity and dissolved metals, metalloids and non-metallic inorganic substances;</li> <li>b) a program of progressive sampling and characterisation to identify dispersive and non-dispersive spoil and the salinity, acid and alkali producing potential and metal concentrations of waste rock;</li> <li>c) a materials balance and disposal plan demonstrating how potentially acid forming and acid forming waste rock will be selectively placed and/or encapsulated to minimise the potential generation of acid mine drainage;</li> <li>d) where relevant, a sampling program to verify encapsulation and/or placement of potentially acid-forming and acid-forming waste rock;</li> <li>e) how often the performance of the plan will be assessed;</li> <li>f) the indicators or other criteria on which the performance of the plan will be assessed;</li> <li>g) rehabilitation strategy; and</li> <li>h) monitoring or rehabilitation, research and/or trials to verify the requirements and methods for</li> </ul>

	decommissioning and final rehabilitation of the placed materials, including the prevention and management of acid mine drainage, erosion minimisation and establishment of vegetation cover.
<b>J15</b>	<p><b>Chemicals and flammable or combustible liquids</b></p> <p>All explosives, hazardous chemicals, corrosive substances, toxic substances, gases and dangerous goods must be stored and handled in accordance with the current Australian standard where such is applicable. Flammable and combustible liquids, including petroleum products, should be stored and handled in accordance with the latest edition of AS1940—The storage and handling of flammable and combustible liquids. Where no relevant Australian standard exists store such materials within an effective on-site containment system.</p>
<b>J16</b>	<p><b>Contaminated land</b></p> <p>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.</p>
<b>J17</b>	<p>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.</p>
<b>J18</b>	<p><b>Transportation</b></p> <p>The environmental authority holder must ensure that vehicle loads (including trains) are secure prior to transporting materials off the mining lease to minimise windblown emissions (i.e. coal dust) or spillage of any material during transport.</p>
<b>J19</b>	<p><b>Infrastructure</b></p> <p>All buildings, structures, mining equipment and plants erected and/or used for the mining activities must be removed from the site prior to surrender, except where agreed in writing by the administering authority.</p>
<b>J20</b>	<p><b>Exploration</b></p> <p>Disturbance due to exploration activities in areas not scheduled to be mined within two (2) years must be rehabilitated in accordance with provisions detailed in the <i>Code of Environmental Compliance for Exploration and Mineral Development Projects</i>.</p>

<b>Schedule K - Biodiversity</b>	
<b>Condition Number</b>	<b>Condition</b>
<b>K1</b>	<p><b>Biodiversity offsets</b></p> <p>The holder of this environmental authority must provide an offset for impacts on applicable state significant biodiversity values, in accordance with Queensland Biodiversity Offsets Policy. The biodiversity offset must be consistent with the requirements for an offset as identified in the Biodiversity Offset Strategy (as per condition <b>K2</b>) and must be provided:</p> <ul style="list-style-type: none"> <li>a) prior to impacting on state significant biodiversity values; or</li> <li>b) where a land based offset is to be provided, within 12 months of the later of either of the following:</li> </ul>

	<p>1. the date of issue of this environmental authority; or</p> <p>2. the relevant stage identified in the Biodiversity Offset Strategy submitted under condition <b>K2</b>; or</p> <p>c) where an offset payment is to be provided, within 4 months of the later of either of the following:</p> <p>1. the date of issue of this environmental authority; or</p> <p>2. the relevant stage identified in the Biodiversity Offset Strategy submitted under condition <b>K2</b>.</p>
<b>K2</b>	<p>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.</p>

## Appendix B MNES assessment report – EPBC Act

On 13 May 2011, Glencore Coal Queensland Pty Ltd (the proponent, formally Xstrata Coal Queensland Pty Ltd (XCQ)) referred the Rolleston Coal Expansion Project (the project) to the then Department of Sustainability, Environment, Water, Population and Communities (SEWPAC), now the Department of the Environment (DOE) for a determination as to whether the project would constitute a controlled action with respect to potential impacts on MNES under the EPBC Act (Referral No. 2011/5965).

On 21 June 2011, the delegate of the Australian Government Environment Minister determined the project to be a controlled action pursuant to section 75 of the EPBC Act. The relevant controlling provisions for the project were determined as being:

- world heritage properties (sections 12 and 15A)
- national heritage places (sections 15B and 15C)
- listed threatened species and communities (sections 18 and 18A)
- listed migratory species (sections 20 and 20A)
- Great Barrier Reef Marine Park (sections 24B and 24C).

On 22 August 2011, a variation to the referral was made to include the Springwood Mining Lease Application area (MLA70458). This additional area provided for the diversion of Sandy Creek into Meteor Creek and other associated water management infrastructure. On 4 November 2011, the delegate of the Australian Government Environment Minister accepted the variation to the proposal in accordance with section 156B of the EPBC Act.

On 2 September 2013, another variation to the referral was made to include an area of 408.9 hectares (ha) between the existing Rolleston Coal Mine and the proposed expansion. On 12 November 2013, the delegate of the Australian Government Environment Minister accepted the variation to the proposal in accordance with section 156B of the EPBC Act.

### Water trigger

Coal seam gas and large coal mining developments with the potential to have a significant impact on water resources now require referral to and approval from the Commonwealth Minister for the Environment under the EPBC Act.

On 17 October 2013, the Commonwealth Minister for the Environment notified XCQ that the potential for a significant impact on a water resource in relation to coal seam gas development and large coal mining development (sections 24D and 24E), was an additional controlling provision for the project. The proposed action must be approved for the purposes of this controlling provision before it can proceed.

### Estimates of disturbance and impacts

#### Threatened Ecological Communities

Table 1 of this assessment report summarises the estimated current extent, and the area of clearing of each TEC within the project area.

**Table 1 Threatened ecological communities within the project area (Source: EIS Chapter 21, tables 21–7 & 21–8)**

Ecological community	EPBC Act status	RE relevant to project area	Area of community within project area (ha)	Area of community to be cleared within project area (ha)
Brigalow ( <i>Acacia harpophylla</i> dominant and co-dominant)	Endangered	11.4.8, 11.4.9 and HVR 11.4.9	51	42
Natural grasslands of the Queensland Central Highlands and Northern Fitzroy Basin	Endangered	11.3.21, 11.3.3 and 11.8.11 within Basalt Downs subregion	1751	1112
Semi – evergreen vine thickets of the Brigalow Belt and Nandewar bioregions	Endangered	11.8.6, 11.9.4 and HVR 11.8.6	194	51

Ecological community	EPBC Act status	RE relevant to project area	Area of community within project area (ha)	Area of community to be cleared within project area (ha)
Coolibah-black box woodlands of the Darling Riverine Plains and Brigalow Belt south bioregions	Endangered	11.3.3 and 11.3.27 within SBB bioregion	124	28

Specific advice on each TEC, including information on threats, impacts and mitigation and management measures as presented in Appendix Q-1 of the EIS, is included in Appendix B of this assessment report.

### Listed threatened flora species

An analysis of the range, habitat requirements and available habitat within the project area identified the following threatened flora species as likely or possible to occur within the project area.

Likely to occur:

- a tufted grass (*Aristida annua*) – vulnerable
- king blue grass (*Dichanthium queenslandicum*) – vulnerable
- blue grass (*Dichanthium setosum*) – vulnerable.

Possible to occur:

- ooline (*Cadellia pentastylis*) - vulnerable
- *Marsdenia brevifolia* – vulnerable.

Table 2 of this assessment report summarises the estimated current extent of potential habitat for each threatened flora species potentially occurring within the project area and the likely clearing area of those habitats.

**Table 2 Threatened flora species potentially occurring within the project area (Source: EIS Chapter 21, tables 21–10 & 21–11)**

Scientific name	Common name	EPBC Act status	Area of potential habitat (ha)	Potential habitat loss (ha)
<i>Aristida annua</i>	A tufted grass	Vulnerable	5,547	3,452
<i>Cadellia pentastylis</i>	Ooline	Vulnerable	194	51
<i>Dichanthium queenslandicum</i>	King blue-grass	Endangered	1751	1112
<i>Dichanthium setosum</i>	Blue grass	Vulnerable	1751	1112
<i>Marsdenia brevifolia</i>		Vulnerable	3796	2339

Field surveys did not find *Cadellia pentastylis* or *Marsdenia brevifolia* and XCQ considered that impacts to these species were therefore unlikely. Specific advice on the threatened flora species likely to occur and likely to be impacted by the project, including information on threats, impacts and mitigation and management measures (as presented in Appendix Q-1 of the EIS), is included in Appendix B of this assessment report.

EHP notes that the Australian government would require offsets for significant residual impacts on threatened flora species in accordance with the EPBC Act Environmental Offsets Policy.

### Listed threatened fauna species

Table 3 summarises the estimated extent of potential habitat for each threatened fauna species potentially occurring within the project area, and the potential loss of those habitats, based on an analysis of the range, habitat requirements and available habitat within the project area.



**Table 3 Threatened fauna species likely to occur and the potential habitat loss within the project area  
(Source: EIS Chapter 21, tables 21–13 and 21–14)**

Common name	Scientific name	EPBC Act status	Likelihood of occurrence	Area of potential habitat (ha)	Potential habitat loss (ha)
Red goshawk	<i>Erythrotriorchis radiatus</i>	Vulnerable	Possible to occur	5086	2891
Black-throated finch	<i>Poephila cincta cincta</i>	Endangered	Possible to occur	694	358
Australian painted snipe	<i>Rostratula australis</i>	Endangered migratory	Confirmed present	115	23
Squatter pigeon (southern)	<i>Geophaps scripta scripta</i>	Vulnerable	Confirmed present	5086	2891
Black-breasted button quail	<i>Turnix melanogaster</i>	Vulnerable	Confirmed present	193	51
South-eastern long-eared bat	<i>Nyctophilus corbeni</i>	Vulnerable	Possible to occur	5086	2891
Northern quoll	<i>Dasyurus hallucatus</i>	Endangered	Possible to occur	4898	2984
Koala	<i>Phascolarctos cinereus</i>	Vulnerable	Possible to occur	432	158
Spotted-tailed quoll	<i>Dasyurus maculatus</i>	Endangered	Possible to occur	5279	2891
Ornamental snake	<i>Denisonia maculata</i>	Vulnerable	Likely to occur	2986	1786
Yakka skink	<i>Egernia rugosa</i>	Vulnerable	Possible to occur	4898	2826
Collared Delma	<i>Delma torquata</i>	Vulnerable	Possible to occur	745	400
Dunmall's snake	<i>Furina dunmali</i>	Vulnerable	Possible to occur	745	400

Field surveys confirmed the presence of three threatened fauna species: *Rostratula australis*, *Geophaps scripta scripta* and *Turnix melanogaster*.

Specific advice on the following threatened fauna species likely to occur and likely to be impacted by the project, including information on threats, impacts and mitigation and management measures (as presented in Appendix Q-2 of the EIS), is included in Appendix B of this assessment report:

- australian painted snipe (*Rostratula australis*)
- squatter pigeon (southern) (*Geophaps scripta scripta*)
- black-breasted button-quail (*Turnix melanogaster*)
- ornamental snake (*Denisonia maculata*)
- southern-eastern long-eared bat (*Nyctophilus corbeni*)
- koala (*Phascolarctos cinereus*).

EHP notes that the Australian government would require offsets for residual significant impacts on listed threatened fauna species in accordance with the EPBC Act Environmental Offsets policy.

## Indirect impacts

The EIS provided an adequate assessment of the likely presence of EPBC Act listed ecological communities, threatened species and migratory species on the project site as well as the potential impacts on those values due to project activities causing direct disturbance.

The IESC highlighted the weakness of the EIS in assessing potential indirect impacts of the project on the values outside the project area, in particular on EPBC Act listed ecological communities, threatened species, migratory species and water resources. The IESC made specific reference to the potential for indirect impacts on Coolibah (*Eucalyptus coolabah*) woodland on alluvial plains and the threatened species they may support (e.g. *Geophaps scripta scripta*) as well as impacts on riparian vegetation that may support threatened species such as *Poephilia cincta cincta*.

Some changes were made to the EIS to clarify the low likelihood of potential impacts on groundwater dependent ecosystems (GDEs) as a result of groundwater depressurisation outside of Meteor Creek alluvium; an appropriate response to the IESC's concerns since groundwater depressurisation is the primary source of indirect impact that is relevant.

## Cumulative impacts

The project area and the surrounding area have been considerably modified by land use over a period of greater than 100 years. The surrounding area has predominantly been used for agriculture and grazing, however there are areas of protected estate and State forest immediately to the east, west and south. The proposed Meteor Downs South mine (MLA70452) is adjacent to the north of the project area. The next closest proposed mine is Bandanna Energy, 40km north of the project area. Other development proposed in the area includes coal seam gas extraction and associated gas pipelines.

The development of the Meteor Downs South project and the Rolleston Expansion project would result in the loss of 1146ha of the natural grasslands TEC. Both projects have the potential to impact on threatened fauna and their habitat; however the mobility of species and the relatively large home range of each species would reduce the significance of these impacts. Four threatened fauna species: the koala, south-eastern long-eared bat, red goshawk and squatter pigeon; would be impacted by both projects. Environmental offsets would partially compensate for the loss of habitat and would likely reduce but not prevent the long-term decline of these threatened species in the region.

## Offsets

Following implementation of proposed mitigation measures, the proposed action may result in residual significant impact to the following MNES:

- coolibah-black box woodlands TEC
- natural grasslands TEC
- brigalow TEC
- semi-evergreen vine thicket TEC
- ooline
- *Marsdenia brevifolia*
- *Aristida annua*
- king blue-grass
- blue grass
- ornamental snake
- black-breasted button quail
- squatter pigeon
- south-eastern long-eared bat.

XCQ has proposed offsets for residual significant impact to MNES confirmed or considered by XCQ as likely to occur in the project area as follows:

- coolibah-black box woodlands TEC – 28ha
- brigalow TEC – 42ha
- semi-evergreen vine thicket TEC - 51ha
- natural grasslands TEC – 1112ha
- king blue grass – 1112ha

- blue grass – 1112ha
- *Aristida annua* – 3452ha
- ornamental snake – 1786ha
- black-breasted button quail – 51ha.

However, the proposed offsets are not fully consistent with the EPBC Act Environmental Offsets Policy in that offsets were not proposed for all residual significant impacts. Direct impacts to foraging and breeding habitat for the squatter pigeon as well as roosting and breeding habitat for the south-eastern long-eared bat should also be provided (in the absence of further trapping surveys). Indirect off site impacts on threatened ecological communities, threatened species and migratory species have not been adequately assessed nor offsets proposed.

## World Heritage properties (sections 12 and 15A)

### Great Barrier Reef World Heritage Area

#### Description

The Great Barrier Reef is the largest coral reef ecosystem on earth and one of the best managed marine areas in the world. At 346,000 square kilometres, the reef is one of the richest and most diverse natural ecosystems on Earth.

#### Impacts of proposed action

The project area would be 675km upstream of the Great Barrier Reef World Heritage Area (GBRWHA) and would not directly impact on the GBRWHA. The project could result in downstream impacts to the GBRWHA through decline in water quality in a catchment that is hydrologically linked to the GBRWHA. The three watercourses (Meteor Creek, Sandy Creek and Bootes Creek) located in the project area are part of the Fitzroy catchment.

During the construction phase of the proposed action the quality of water may be impacted during clearing and bulk earthworks, resulting in erosion and off-site transfer of sediment.

Glencore Coal Queensland Pty Ltd (the proponent, formally Xstrata Coal Queensland Pty Ltd (XCQ)) considered that the proposed action would have low impact on the GBRWHA because of the relatively small project size in relation to the size of the GBRWHA catchment area; the length of waterway and number of impoundments (five weirs) between the project area and the GBRWHA that would result in a substantial dilution and capture of any sediments or contaminants released; an estimate that only 5-10% of sediment from the Fitzroy River moves beyond the river delta; and proven management of runoff demonstrated at the current Rolleston Coal Mine.

Potential 'facilitated impacts' to the GBRWHA could result from an increase in shipping associated with the project, which would require an additional 56 vessels per annum for coal transport

#### Avoidance and mitigation measures

Water quality issues would be managed within the project area during construction, operation and decommissioning phases to protect the freshwater environments within and downstream the project area. Actions proposed to be undertaken to minimise the impacts on water quality in the GBRWHA catchment included:

- reducing the project footprint as to avoid or minimise the disturbance of natural vegetation and insitu soil through design and the delineation of clearing limits (on plans and by cadastral survey and or GPS) prior to the commencement of work
  - use of clean water diversions and levees to minimise 'mine affected' water volumes
  - installation of temporary erosion and sediment controls
  - collecting and treating mine affected water from within the project footprint to ensure operational discharges would meet the quality standards required in approvals
  - re-use of mine-affected water within the project area for dust suppression and other beneficial uses
  - rehabilitation of disturbed areas larger than 5ha with native species within 18 months of mining completion
  - rehabilitation of the diversions of Bootes and Sandy creeks within the project area. A minimum corridor width of rehabilitation planting would apply as follows:
    - Bootes Creek – 100 metres

- Sandy Creek – 50 metres
- storage of chemicals and fuels in accordance with AS 1940 - The storage and handling of flammable and combustible liquids
- a water quality monitoring program to assess the performance and compliance of onsite controls
- regular inspection and assessment of water quality controls by a suitably qualified and experienced persons
- review and amendment of the Rolleston coal water management plan and Rolleston coal environmental management plan as required for the mine expansion
- agreements for loading and transport of coal within the Port of Gladstone to address cumulative and facilitated impacts.

Actions to manage cumulative and facilitated impacts of the project are proposed. This includes advanced agreements for the loading and transport of product coal with the Port of Gladstone. Residual impacts of the project would be offset through the provision of compensatory habitat, an action that contributes to the retention of vegetation within the bioregion. Effects on downstream values would be minimised through appropriate on-site management, storage and beneficial re-use of mine affected water, effectively minimising potential impacts on the quantity and quality of water in the wider catchment.

Facilitated impacts such as increases in shipping (through the GBRMP) have been identified and are proposed for further detailed consideration when key assessments, such as DOE's Great Barrier Reef Strategic Assessment. The responsibility for management would be determined when these assessments are complete and agreed by Commonwealth and State Governments.

It is proposed that a review of Xstrata Coal Queensland Pty Ltd (XCQ) actions and responsibilities for facilitated impacts, in particular increased shipping, would occur following completion of the GBR strategic assessment. The GBR Strategic Assessment would recommend suitable mitigation and management measures. The EIS states that the Gladstone Port approval required, in conditions, specific mitigation and avoidance measures and that the port approval has capacity to accommodate their shipping needs.

## **Residual impact**

XCQ acknowledged that the project would supply additional coal to the Gladstone port and this increase may a resultant in additional impact on the GBRWHA through a number of effects including shipping increases with an additional 56 ships per annum proposed.

Indirect impacts on the GBRWHA from changes in water quality during construction and during extreme weather events during operation were considered to be unlikely due to the significant distance between the project area and the GBRWHA. Management measures were proposed to minimise the risk of emission of pollutants from the site and significant downstream water quality impacts.

Significant facilitated impacts on the values of the GBRWHA, GBRNHP and GBRMP as a result of the proposed project are not anticipated.

## **Cumulative impact**

The proposed action would result in an additional 56 ships per annum from coal transport in the GBRWHA but this shipping increase would be within the Gladstone Port's current approved overall throughput.

## **Consideration of conservation advice/plans**

The primary management objectives for World Heritage properties are part of Australia's general obligations under the World Heritage Convention:

- to protect, conserve and present the World Heritage values of the property
- to integrate the protection of the area into a comprehensive planning program
- to give the property a function in the life of the Australian community
- to strengthen appreciation and respect of the property's World Heritage values, particularly through educational and information programs
- to keep the community broadly informed about the condition of the World Heritage values of the property
- to take appropriate scientific, technical, legal, administrative and financial measures necessary for achieving the foregoing objectives.

In achieving these primary objectives, due regard must be given to ensuring that development does not have a significant impact on the World Heritage values and their integrity.

## Conclusion

EHP considers that there is unlikely to be adverse impacts on the GBRWHA due to the distance of the proposed action from the GBRWHA and the water management conditions that will be placed on the project in the Environmental Authority.

EHP considers that potential facilitated impacts on the GBRWHA due to increased shipping have been considered in assessments of the Gladstone Port development and the GBR strategic assessment. Significant facilitated impacts on the values of the GBRWHA, GBRNHP and GBRMP as a result of the proposed project are not anticipated.

---

## National Heritage places (sections 15B and 15C) – Great Barrier Reef

### Description

The Great Barrier Reef is the world's largest coral reef ecosystem and includes over 2,900 separate coral reefs. It contains deep water features of the adjoining continental shelf including canyons, channels, plateaux and slopes. It is made up of 70 bioregions comprising 30 reef bioregions and 40 non-reef bioregions. The Great Barrier Reef contains over 2000km<sup>2</sup> of mangroves, representing 54% of the world's mangrove species diversity, 6000km<sup>2</sup> of seagrass beds and 900 islands ranging from coral cays to continental islands.

The Great Barrier Reef was one of 15 Australian World Heritage places included in the National Heritage List on 21 May 2007.

### Potential impacts

The project is not located in the National Heritage listed place – Great Barrier Reef (NHPGBR) and therefore the proposed action will not have any direct impacts on the Great Barrier Reef. Potential indirect impacts are as detailed for the GBRWHA above. The proposed actions are not considered by EHP to be likely to have a significant impact on the values of the Great Barrier Reef.

### Conclusion

EHP considers that there is unlikely to be adverse impacts on the NHPGBR due to the distance of the proposed action from the Great Barrier Reef and the water management conditions that would be placed on the project in the environmental authority.

EHP considers that potential facilitated impacts on the GBRWHA due to increased shipping have been considered in assessments of the Gladstone Port development and the GBR strategic assessment. Significant facilitated impacts on the values of the GBRWHA, GBRNHP and GBRMP as a result of the project are not anticipated.

---

## Great Barrier Reef Marine Park (sections 24B and 24C)

### Description

The numerous values of the Great Barrier Reef are protected in a marine park which is included within the GBRWHA. The Great Barrier Reef Marine Park is a multi-use area important for biodiversity, conservation, tourism, recreation, commercial fishing, boating and shipping.

### Potential impacts

The project is not located in the Great Barrier Reef Marine Park and therefore the proposed action will not have any direct impacts on the marine park. Potential indirect or facilitated impacts are as detailed for the GBRWHA.

### Conclusion

EHP considers that there is unlikely to be adverse impacts on the Great Barrier Reef Marine Park due to the distance of the proposed action from the Great Barrier Reef Marine Park and the water management conditions

---

placed on the project in the Environmental Authority.

EHP considers that potential facilitated impacts on the GBRWHA due to increased shipping have been considered in assessments of the Gladstone Port development and the GBR strategic assessment. Significant facilitated impacts on the values of the GBRWHA, GBRNHP and GBRMP as a result of the project are not anticipated.

---

## Listed threatened species and communities (sections 18 and 18A)

### Listed threatened ecological communities

#### Brigalow (*Acacia harpophylla* dominant and co-dominant)

**EPBC Act listing status: endangered**

##### Description

The Brigalow (*Acacia harpophylla* dominant and co-dominant) threatened ecological community (Brigalow TEC) is characterised by the presence of brigalow (*Acacia harpophylla*) as one of the three most abundance tree species. Brigalow is usually dominant in the tree layer or co-dominant with other species such as *Casuarina cristata* (belah), other species of acacia or species of eucalyptus. Occasionally belah, or species of acacia or eucalyptus, may be more common than brigalow within the broad matrix of brigalow vegetation. The structure of the vegetation ranges from open forest to open woodland. The height of the tree layer varies from about 9m in low rainfall areas (averaging around 500mm per annum) to around 25m in higher rainfall areas (averaging around 750mm per annum). A prominent shrub layer is usually present.

Brigalow flowers spasmodically and seeds generally remain viable for less than a year with germination and establishment requiring good rainfall during what is traditionally the driest time of the year. Brigalow trees sucker easily from their roots and re-sprout after damage as long as the root stocks remain intact. Brigalow and many of the shrub and tree species associated with brigalow are capable of re-sprouting after low to moderate intensity fire damage. Brigalow and belah are tolerant of saline conditions and brigalow is extremely drought tolerant.

Fauna species associated with the Brigalow TEC rely on a range of attributes in the vegetation for habitat. These include litter and woody debris on the forest floor (especially important for reptiles), tree hollows and pockets under the bark of large trees (roost sites for various birds and mammals, including bats), and mistletoes and other sources of nectar, seeds and fruit (food for birds including belah seed for the vulnerable glossy black-cockatoo).

##### Distribution

The Brigalow TEC extends from south of Townsville in Queensland to northern New South Wales. In Queensland, the Brigalow TEC occurs predominantly within the Brigalow Belt North, Brigalow Belt South and Southeast Queensland bioregions, with smaller amounts in the Mulga Lands bioregion.

The Brigalow TEC has undergone a severe decline in extent due to clearing for agricultural use. At the time of listing under the EPBC Act (April 2001), information supporting the nomination estimated an original extent of 7,324,560 hectares (7,020,360ha in Queensland and 304,200ha in New South Wales) with approximately 804,264ha (661,314ha in Queensland and 142,950ha in New South Wales) remaining (approximately 10% of original extent).

### Survey requirements and survey effort

#### EPBC survey requirements/techniques

There are no specific guidelines for survey requirements, however Brigalow TEC is identifiable at all times of the year.

#### Project survey effort

Flora field surveys were undertaken over three periods. Baseline flora and vegetation surveys were conducted for the pre-wet season from the 7–11 of November 2011, post wet season from 16–18 March 2013, from the 11–13 April 2012, and 17 April 2012. A second flora and vegetation survey occurred for the pre-wet season from

---

the 4–11 November 2012 and post-wet season from 13–16 March 2013. A third winter vegetation survey along Sandy, Meteor and Bootes Creeks occurred on 1 and 2 July 2013 and on 3 and 30 July 2013 respectively. The baseline flora survey in 2011 was primarily focused on verifying the regional ecosystem mapping and developing a comprehensive flora list for the project area. Seventy-nine quaternary and 32 secondary or tertiary sites were undertaken in accordance with Queensland Herbarium survey methodology (Neldner *et al.* 2005). The quaternary and secondary-tertiary level sites were used to ground-truth RE mapping and support preliminary revised RE mapping at a scale of 1:10,000. The second flora surveys in 2012 and 2013 completed detailed six secondary/tertiary sites, 31 quaternary sites, and six biocondition sites to increase replication and improve survey density within regional ecosystems that occurred within the project footprint. The third vegetation survey was conducting in July 2013 to verify regional ecosystem mapping along Sandy, Meteor and Bootes creeks, which were not accessible on previous surveys. Fourteen quaternary sites were undertaken in the third survey.

### **Occurrence within project area**

Within the project area there is 51ha of Brigalow TEC comprised of 2ha of RE 11.48, 35ha of RE 11.4.9, and 15ha of high value regrowth of RE 11.4.9 that meets the criteria for inclusion in the threatened ecological community.

### **Impacts of the proposed action**

The potential impacts associated with the project activities include:

- clearing of 42ha of the Brigalow TEC
- fragmentation and potential weed introduction
- changes in hydrology (surface waters and groundwater) leading to long-term changes in soil moisture and impacts to surface water dependent ecosystems which could potentially exacerbate weed/ pest invasion both on the project site and on adjacent areas
- reduced connectivity
- changes in species composition (through dust deposition, burning or weed/pest invasion).

### **Proposed mitigation and management measures**

XCQ proposed the following mitigation and management measures relevant to Brigalow TEC:

- avoidance of areas of Brigalow TEC by amendment of infrastructure layout or small changes to mine pit boundaries
- education of staff and contractors on location, type and importance of Brigalow TEC in project area
- pre-clearance surveys to further delineate extent and condition of Brigalow TEC
- use of existing cleared areas as much as possible during construction
- demarcation of clearing boundaries
- seed collection and stockpiling of topsoil
- weed management
- monitoring
- preparation and implementation of an offset management plan.

### **Residual impact**

The proposed action would impact on 42ha of Brigalow TEC on the project site. Potential impacts to Brigalow TEC adjacent to the project site resulting from groundwater depressurisation, changed surface flows and water quality have not been quantified nor suitably assessed.

### **Cumulative impact**

XCQ did not assess the cumulative impacts on Brigalow TEC.

### **Offsets**

XCQ proposed to provide offsets for the residual impact to Brigalow TEC, and identified 28ha of potential offset areas within their preferred location of Meteor Downs. Based on a desktop assessment, XCQ concluded that there was 176,854ha of potential Brigalow TEC offset area available within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advice

### Recovery plan

A recovery plan has not been prepared for the Brigalow TEC.

### Threat abatement plan

There are no threat abatement plans in place for the Brigalow TEC.

### Conservation advice

Commonwealth Conservation Advice for Brigalow TEC was approved by the Minister on the 17 December 2013.

The approved conservation advice provides a detailed overview of the description, conservation status, distribution and habitat of the Brigalow TEC. The main threats to the Brigalow TEC, research priorities and priority conservation actions are listed. The conservation advice identifies that the main threats to the Brigalow TEC include factors that may further reduce its extent or cause a decline in condition. The most important threats and risks are clearing, fire, weeds, feral animals and inappropriate grazing regimes.

The conservation advice identifies the priority recovery and threat abatement actions required for the Brigalow TEC and these are summarised below:

### Threat reduction/control

- protect remnant and regrowth areas and nearby native vegetation including buffer zones and connecting corridors
- where clearance is unavoidable, mitigate the severity of impacts by: avoiding higher quality areas, avoiding fragmentation, minimising hydrological disruption, minimising the spread of weeds, and by providing offsets relevant to the location and quality of affected patches
- manage areas of Brigalow TEC to reduce threats, including through:
  - fire management that considers Brigalow conservation, protection and ecological heterogeneity
  - targeted weed control (e.g. spot application of herbicides, rather than aerial spraying) with a particular focus on high biomass exotic grasses (buffel grass, Rhodes grass, green panic grass)
  - coordinated feral animal control (foxes, cats and pigs)
  - avoiding fertiliser application
  - minimising tree thinning and soil disturbance
  - managing grazing pressure
  - encouraging a shrubby understorey.

### Land management

- encourage landholders to balance primary production and the conservation of native flora and fauna within and close to the Brigalow TEC through measures such as:
  - managing stocking rates, grazing practices and livestock camp sites to avoid damage to woodland understorey and ground cover
  - leaving trees, or clumps of regrowth, in paddocks to maintain connections between patches of native flora and fauna habitat
  - connecting shade-lines to one another and keeping them as wide as possible (ideally more than 100m)
  - avoiding the application of fertiliser, or the aerial/broad-scale spraying of herbicides
  - leaving dead trees standing and allowing dead timber and leaf litter to rot.
- undertake regeneration of high value regrowth sites and revegetation of degraded sites
- increase the area of Brigalow TEC managed for conservation
- establish adequate buffer zones to protect remnants
- develop and implement water management, sediment erosion and pollution control and monitoring plans.

### Management for wildlife

- undertake management actions that help to increase the diversity of species and their abundance with consideration of habitat use at various scales, including:



- retaining fallen timber and leaf litter for small mammals and reptiles
- retaining standing dead trees or old trees with hollow limbs for nesting sites for birds, mammals and reptiles
- re-introducing microhabitat features (e.g. rocks, logs and other woody debris) to disturbed sites
- discouraging species like noisy miners and introduced predators by maintaining large patches of woodland with complex structure
- avoiding clearing remnant vegetation and retaining areas of Brigalow TEC regrowth
- encouraging woodland regeneration close to areas of existing woodland.

The factors in the approved conservation advice have been considered in undertaking this assessment and making the recommendations for conditions of approval.

## Conclusion

XCCQ proposed a number of mitigation and management measures to reduce the level of impact to Brigalow TEC and must offset residual impacts in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the Brigalow TEC.

EHP is of the view that the proposed action would not have an unacceptable direct impact on the Brigalow TEC. However, indirect impacts from groundwater depressurisation on terrestrial ecological values, including within Albinia National Park, as well as potential impacts from changed surface flows and water quality have not been suitably assessed. Consequently, further assessment would be required to guide statutory decision-making and management responses for indirect impacts to this TEC.

---

## Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin

### EPBC Act listing status: endangered

#### Description

The natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin threatened ecological community (natural grassland TEC) consists of native grasslands typically composed of perennial native grasses. The grasslands usually occur on flat ground or gently undulating rises with fine-grained, cracking clay soils that are often deep and dark in colour, although soils may be shallower on ridges or sloping land. The soils are derived from basalt or fine-grained sedimentary rocks, or where this material has been transported to form extensive alluvial plains along ancient and flood-prone watercourses.

The natural grassland TEC is mostly dominated by blue-grass (*Dichanthium sericeum*). Tropical three-awned grasses (*Aristida* species) and panic grasses (*Panicum* species) are also a major part of the grasslands. Drier sites may have more Mitchell grasses (*Astrelba* species). Native perennial grass indicator species for this community are *Aristida leptopoda*, *Astrelba elymoides*, *Astrelba squarrosa*, *Eriochloa crebra*, *Panicum queenslandicum*, *Thellungia advena*, *Aristida latifolia*, *Astrelba lappacea*, *Bothriocloa erianthoides*, *Dichanthium sericeum*, *Panicum decompositum* and *Paspalidium globoideum*. Shrubs are typically sparse. However, in some areas the cover of shrubs such as sally wattle (*Acacia salicina*) and mimosa (*Acacia farnesiana*) can be more extensive.

These tussock grasslands are considered to be one of the most threatened ecosystems in Australia. They continue to be threatened by conversion of native pastures to improved pastures, cropping and overgrazing by stock. The grasslands provide habitat for threatened species such as king blue-grass (*Dichanthium queenslandicum*).

#### Distribution

The natural grassland TEC occurs entirely within Queensland within the Brigalow Belt North and Brigalow Belt South bioregions and within the Fitzroy Basin, Burdekin, South West Qld, Border Rivers Maranoa-Balonne and Desert Channels Natural Resource Management regions. It extends from Collinsville in the north to Carnarvon National Park in the south.

## **Survey requirements and survey effort**

### **EPBC survey requirements/techniques**

- Sites must be assessed during a good season, within two months of cessation of disturbance (fire/grazing/mowing/slashing) and within two months of effective rainfall
- Key diagnostic characteristics for recognising the natural grassland TEC:
  - within the distribution of the TEC
  - tree canopy absent or sparse
  - ground layer dominated by perennial native grasses and contains at least three of the indicator native species listed.

### **Project survey effort**

Vegetation and Flora surveys were undertaken in November 2012 and March 2013 to determine the ecological condition of the natural grassland TEC within the project footprint. These surveys consisted of 31 quaternary, six secondary/tertiary sites, six BioCondition assessments and four natural grassland assessment sites.

### **Occurrence within project area**

Natural grasslands within the project area include regional ecosystems 11.3.21, 11.8.11 and 11.4.4. The total area of natural grasslands within the project area was estimated to be 1751ha.

### **Impacts of the proposed action**

A total of 1,112ha of grassland would be impacted by the project. Impacts would include the clearing of grasses, removal of topsoil, fragmentation and potential weed introduction.

### **Avoidance and mitigation measures**

XCQ proposed the following mitigation and management measures relevant to natural grasslands TEC:

- pre-clearance surveys to further delineate the extent and condition of the natural grassland TEC to inform rehabilitation and offset management plans
- obtain relevant approvals and permits
- demarcation of clearing boundaries
- existing cleared areas used as much as possible during construction
- vegetation clearing techniques
- seed collection
- stockpiling of topsoil
- weed management
- rehabilitation to achieve a natural grassland (130ha of bluegrass)
- monitoring
- monitoring of retained grassland areas in the north of the project area associated with the Spring Creek floodplain.
- education of staff and contractors on location, type and importance of natural grassland TEC in the project area
- preparation and implementation of an offset management plan.

### **Residual impact**

An estimated 1112ha of natural grassland TEC would be impacted by the project.

### **Cumulative impacts**

The proposed action and the proposed adjacent Meteor Downs South project would result in a total loss of 1135.9ha of natural grassland TEC. The provision of offsets would partially compensate for this loss and would likely reduce, but not prevent the long-term decline of natural grasslands in the region.

## Offsets

XCQ proposed to offset the impacts to natural grassland TEC, and identified 2508ha of potential natural grassland habitat within their preferred offset location of Meteor Downs. A desktop assessment identified 168,148ha of potential natural grassland offset area within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advice

### Recovery plan

A recovery plan has not been prepared for the natural grassland TEC.

### Threat abatement plan

There are no threat abatement plans relevant to the natural grassland TEC.

### Conservation advice

Commonwealth Conservation Advice for Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin approved by the Minister on the 15 December 2008.

The approved conservation advice provides a detailed overview of the description, conservation status, distribution and habitat of the natural grassland TEC. The main threats to the natural grassland TEC, research priorities, and priority conservation actions are listed.

The conservation advice identifies that the main threats to the natural grassland TEC include grazing, cropping and pasture improvement; weeds and pest animals; mining activities; construction of roads and other infrastructure. Lack of knowledge about the grasslands and climate change are identified as potential threats.

The conservation advice identifies the priority recovery and threat abatement actions required for the natural grassland TEC and these are summarised below:

### Habitat loss, disturbance and modification

- monitor known occurrences to identify key threats or the progress of recovery, including the effectiveness of management actions and the need to adapt actions if necessary
- identify occurrences of high conservation priority
- undertake survey work in potential habitat to locate remnants
- avoid mowing and slashing during peak flowering season from spring to summer
- ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the ecological community
- ensure road widening and maintenance activities (or other infrastructure or development activities) in areas where the ecological community occurs minimise adverse impacts on known sites
- investigate and implement formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.

### Invasive weeds

- develop and implement management plans for the eradication of weeds such as parthenium (*Parthenium hysterophorus*), parkinsonia (*Parkinsonia aculeata*), prickly acacia (*Acacia nilotica* subsp. *indica*) and buffel grass (*Cenchrus ciliaris*)
- manage sites to prevent introduction of invasive weeds, which could become a threat to the ecological community, using appropriate methods
- implement appropriate protocols to avoid the spread of weeds including good hygiene measures for mowing and grading equipment and appropriate steps to avoid dispersing seeds when moving stock
- maintain a good cover of native perennial grasses and spell the grasslands from grazing to limit the risk of weed invasion.

### Trampling, browsing or grazing

- grazing management to maintain a good cover of perennial grasses and legumes, especially the most palatable species, through the driest years
- develop and implement a stock management plan for roadside verges and travelling stock routes
- provide and/or promote incentives for good management

- where possible, use an intermittent grazing regime in preference to burning
- avoid burning, grazing or slashing during peak flowering season (spring to summer).

### Animal predation or competition

- develop and implement management plans for the control of the house mouse (*Mus* spp.).

The approved conservation advice has been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

### Conclusion

XCQ proposed a number of mitigation and management measures to reduce the level of impact to ecological community Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin, including:

- pre-clearance surveys and mapping of vegetation
- avoidance and minimisation of disturbance where possible
- rehabilitation of available areas consistent with pre-clearing habitat
- targeted weed control measures.

Residual impacts to the natural grasslands TEC must be offset in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the listed threatened ecological community Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin.

## Coolibah-Black Box woodlands of the Darling Riverine Plains and Brigalow Belt South Bioregions

### EPBC Act listing status: endangered

#### Description

Open eucalypt woodlands formerly occurred across a range of climatic regions of Australia including semi-arid and humid subtropical zones. The position in the landscape of these woodlands, such as on floodplains or uplands, can determine the vegetation structure of these woodlands and consequently, whether they have a more shrubby or more grassy understorey.

The Coolibah–Black Box woodlands of the Darling Riverine Plains and Brigalow Belt South Bioregions (Coolibah–black box woodlands) represent occurrences of one type of semi-arid to humid subtropical woodlands where *Eucalyptus coolabah* subsp. *coolabah* (coolibah) and/or *Eucalyptus largiflorens* (black box) are the dominant canopy species and where the understorey tends to be grassy. The ecological community is associated with the floodplains and drainage areas of the Darling Riverine Plains and the Brigalow Belt South bioregions.

Coolibah–black box woodlands occur further west than the belt of temperate grassy eucalypt woodlands extending through southern Queensland and NSW. The Coolibah–black box woodlands are found on the grey, self-mulching clays of periodically waterlogged floodplains, swamp margins, ephemeral wetlands, and stream levees. The ecological community occurs on a landscape of flat to low relief where small changes in slope and height can influence the species composition. Parts of the ecological community associated with drainage depressions and gilgai, or areas of lower floodplain, remain inundated for longer periods than parts of the ecological community associated with higher floodplain areas of the distribution.

#### Distribution

Coolibah–black box woodlands are limited to the Darling Riverine Plains and Brigalow Belt South bioregions, situated in northern NSW and southern Queensland. The limitation of the ecological community to these two bioregions is based on similarities in vegetation structure and composition, landform, soils and climate. The southern limit of the ecological community is the southern boundary of the Darling Riverine Plains bioregion in NSW (as defined in IBRA version 6.1). This equates with the southern distributional limit for Coolibah-black box woodlands. The northern limit is the northern boundary of the Brigalow Belt South bioregion in Queensland.

Both Coolibah-black box woodlands are widely distributed species that overlap in parts of their respective ranges. It extends further north and west into the Brigalow Belt North, Mulga Lands and Channel Country bioregions of Queensland, NSW and South Australia. Coolibah-black box woodlands extends further south into the Riverina and

Murray Darling Depression bioregions of NSW, Victoria and South Australia. However, it is limited to the two bioregions noted above.

The ecological community was formerly widespread on the inland floodplains of northern NSW and southern Queensland that are associated with the Darling River and its tributaries. This system comprises the northernmost extent of the Murray-Darling Basin. The ecological community is also situated on the southern part of the Fitzroy River system, which falls outside the Murray-Darling Basin but occurs within the Brigalow Belt South Bioregion.

## **Survey requirements and survey effort**

### **EPBC survey requirements/techniques**

There are no specific guidelines for survey requirements, however Coolibah–black box woodlands is identifiable at all times of the year.

### **Project survey effort**

The Coolibah–black box woodlands was targeted in the stage three vegetation surveys along Sandy, Meteor and Bootes creek with a sampling of 14 quaternary sites.

### **Occurrence within the project area**

There are 17 patches of potential Coolibah–black box woodland, above 5ha in project area, associated with regional ecosystems 11.3.3 and 11.3.27. Coolibah–black box woodlands may extend into regional ecosystem 11.3.27 – freshwater wetlands, where the wetlands are associated with fringing woodlands. A total of 124ha of Coolibah-black box woodland occurs within the project area.

### **Impacts of the proposed action**

A total of 28ha of Coolibah-black box woodlands would be directly impacted by the project. The impacts would include direct clearing, fragmentation and the potential for weed invasion. Indirect impacts could occur in a drought event where the trees would normally rely upon groundwater. The proposed action involves dewatering which would remove groundwater resulting in groundwater dependent species such as coolibah to rely on rainfall to recharge groundwater and buffer against salinity.

Potential impacts to Coolibah-black box woodlands adjacent to the project site resulting from groundwater depressurisation on terrestrial ecological values, including within Albinia National Park, as well as from changed surface flows and water quality have not been quantified nor suitably assessed.

### **Avoidance and mitigation measures**

XCQ proposed the following mitigation and management measures relevant to Coolibah-black box woodlands:

- pre-clearance surveys to further delineate and assess the condition of Coolibah- black box woodland to inform rehabilitation and offset management plans
- demarcation of clearing boundaries
- maximum use of cleared areas during construction
- seed collection
- stockpiling of topsoil
- weed management
- monitoring
- education of staff and contractors on location, type and importance of Coolibah- black box woodland within project area
- preparation and implementation of an offset management plan.

### **Residual impact**

A total of 28ha of Coolibah-black box woodlands would be directly impacted on the project site. Detailed design may result in less clearing of these woodlands, particularly if the boundary of the mine pit was retracted north to avoid Sandy Creek. There could be groundwater drawdown impacts on this ecological community, especially if it is a ground water dependent ecosystem. Potential impacts to Coolibah-black box woodlands adjacent to the project site resulting from groundwater depressurisation, changed flows and water quality have not been quantified nor suitably assessed.

## **Cumulative impacts**

XCQ did not assess the cumulative impacts on Coolibah-black box woodland.

## **Consideration of Plans/Agreements/Conservation Advice**

### **Recovery plan**

A recovery plan has not been prepared for the Coolibah-black box woodland.

### **Threat abatement plan**

There are no threat abatement plans in place for the Coolibah-black box woodland.

### **Conservation advice**

Commonwealth Conservation Advice for Coolibah-black box woodlands was approved by the Minister on the 10 February 2011.

The approved conservation advice provides a detailed overview of the description, conservation status, distribution and habitat of the Coolibah-black box woodland. The main threats to the ecological community, research priorities and priority conservation actions are listed. The conservation advice identifies that the main threats to the ecological community include factors that may further reduce its extent or cause a decline in condition. The most important threats and risks are clearing and fragmentation; changes to water flows and patterns; inappropriate grazing regimes; invasion by exotic species; and the low level of protection in reserves.

The conservation advice identifies the priority recovery and threat abatement actions required for the Coolibah-black box woodlands and these are summarised below:

### **Habitat loss, distribution and modification**

- Reduce the threat to the viability of remnants of this ecological community across its range by supporting water efficiency measures for existing irrigation and dryland cropping infrastructure, and minimise future such developments in or near the ecological community that are likely to have a significant impact. This would help minimise changes to the volume and distribution of overland flows impacting on regeneration events in this ecological community.
- Ensure that any further minerals and energy extraction and exploration activities minimise any direct impacts to the ecological community or indirect effects on its ecological function.
- Ensure that any further development of river regulation infrastructure and water storage for irrigation minimises impacts on the ecological function of the ecological community by way of hydrological changes and changed water flow patterns.
- Facilitate wetland health through appropriate local water regulation (whenever possible, given broadscale water regimes and river flows).
- Manage any changes to hydrology that may result in changes to water table levels and/or increased run-off, salinity, sedimentation or pollution.
- Manage any disruptions to water flows.
- Liaise with local councils and State authorities to ensure road widening and maintenance activities (or other infrastructure or development activities) involving substrate or vegetation disturbance in areas where the Coolibah-black box woodlands occur do not adversely impact the ecological community.
- Create or restore wildlife corridors and linkages and ensure that remnants of particularly high quality or that are important in a landscape context are considered for inclusion in reserve tenure, where possible.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure if possible.
- Monitor the progress of recovery, through improved mapping, estimates of extent and condition assessments of the ecological community, and effective adaptive management actions.
- Implement appropriate management regimes to maintain the biodiversity of the ecological community, including listed threatened and migratory species.
- Develop and implement best practice standards for management of remnants on private land public lands.
- Liaise with planning authorities to ensure that planning takes the protection of remnants into account, with due regard to principles for long-term conservation.
- Retain native grasslands, riparian vegetation and understorey shrubs, including the full cycle of vegetation development.

- retain hollows (including protection of existing mature trees), plant native hollow producing species, ensure that trees are always left to grow to maturity and, as a last resort, place artificial hollows (e.g. nest boxes) around area
- Retain fallen logs as habitat for fauna, with logs embedded in the soil necessary for some species, hollow logs for other species.
- Revegetate gullies and stream banks where vegetation has been cleared and widen the strip of riparian vegetation (with appropriate local native species).

### **Invasive weeds**

- Enhance existing management plans for the control of Lippia (*Phyla canescens*) in the ecological community.
- Enhance or develop management plans for the control of other major weeds as identified above, or emerging weed threats as they develop.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on other elements of the ecological community.

### **Trampling, browsing or grazing**

- Develop and implement a management plan for the control and eradication of feral animals, where appropriate.
- Develop and implement a stock management plan, where appropriate, including:
  - reducing stock intensity or excluding grazing in vulnerable areas of the ecological community to allow regeneration of vegetation for fauna habitat, such as food sources or nest sites
  - ensuring that livestock grazing, if it occurs in the area, uses an appropriate management regime and density that does not detrimentally affect the ecological community
  - where appropriate manage total grazing pressure at important/significant sites through exclusion fencing or other barriers e.g. fence riparian areas and stream banks.

### **Fire**

- Develop and implement a suitable fire management strategy for the Coolibah-black box woodlands conservation information.
- Raise awareness of the Coolibah-black box woodlands within the local community utilising a range of media/methods such as fact sheets/information brochures/field days in conjunction with known industry or community interest groups.
- Maintain liaisons with private landholders and land managers where the ecological community occurs.

The approved conservation advice has been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

### **Conclusion**

XCQ proposed a number of mitigation and management measures to reduce the level of impact to Coolibah-black box woodlands including pre-clearance surveys, avoidance and minimisation of disturbance where possible, and targeted weed control measures. Residual impacts to the Coolibah-black box woodlands must be offset in accordance with the EPBC Act Offsets Policy. Remaining remnant Coolibah-black box woodlands must be monitored for changes in health and, where losses are recorded, offsets provided. These offsets must be reflected in the offset management plan.

EHP is of the view that the proposed action would not have an unacceptable direct impact on the listed threatened ecological community Coolibah-black box woodlands of the Darling Riverine Plains and Brigalow Belt South Bioregions. However, indirect impacts from groundwater depressurisation on terrestrial ecological values, including within Albinia National Park, as well as from changed surface flows and water quality have not been quantified nor suitably assessed. Consequently, further assessment is needed to guide statutory decision-making and management responses for indirect impacts to this TEC.

# Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions

**EPBC Act status: endangered**

## Description

Semi-evergreen vine thickets of the Brigalow Belt (North and South) and Nandewar Bioregions ecological community (Semi-evergreen vine thickets TEC) is a form of dry seasonal subtropical rainforest characterised by trees with microphyll sized leaves (2.5–7.5cm long), frequent presence of swollen-stemmed ‘bottle trees’ (*Brachychiton australis*, *B. rupestris*), with vines, twining or scrambling plants prominent. Remnants of the semi-evergreen vine thickets TEC, often referred to as softwood scrub or bottle tree scrub, are most common on undulating plains with fine-grained sedimentary rocks (frequently shale), and on basalt hills and plains. They also occur on coastal dunes, Quaternary alluvium, Tertiary clay plains, old loamy and sandy plains, or hills and lowlands on metamorphic rocks.

Many of the tree species found in the Semi-evergreen vine thickets TEC are able to re-sprout vegetatively after fire or disturbance, either from stems or roots, although many are sensitive to fire and especially hot or frequent fires. Many canopy and emergent tree species have wind-dispersed seed, while lower canopy and understorey species often have bird or bat dispersed fruit/seed.

## Distribution

The Semi-evergreen vine thicket TEC is widely scattered within Queensland, New South Wales, the Northern Territory and Western Australia, having a common structure but considerable regional variation in floristic associations. The Semi-evergreen vine thicket TEC is distinct from related communities located in other bioregions in northern Australia. Semi-evergreen vine thickets TEC occurs in the Brigalow Belt North, Brigalow Belt South and Nandewar bioregions. In Queensland, more than 50% of remnants occur in the Arcadia, Buckland Basalts, Claude River Downs, Northern Bowen Basin and Southern Downs subregions.

Within the Brigalow Belt bioregions, the Semi-evergreen vine thickets TEC has been fragmented, reduced in area and degraded through land clearing and agricultural/grazing practices. The Semi-evergreen vine thickets TEC originally covered almost 900,000ha and the total remnant extent in 2003 was less than 150,000ha (17%), with approximately 37,000ha in protected areas. Remnants often occur in small patches in areas of higher soil moisture.

The Semi-evergreen vine thickets TEC in Queensland comprises ten regional ecosystems – REs - 11.3.11, 11.4.1, 11.5.15, 11.7.1x, 11.8.3, 11.8.6, 11.8.13, 11.11.18, 11.2.3, 11.9.8 and 11.9.4. The Semi-evergreen vine thickets TEC may occur in association with small patches of Brigalow TEC.

## Survey requirements and survey effort

### EPBC Act survey requirements/techniques

There are no EPBC Act survey guidelines in place for the Semi-evergreen vine thickets TEC. The methods for the survey and mapping of REs in Queensland are considered suitable for defining this community.

Under the Queensland Vegetation Management Act 1999 remnant vegetation is defined as ‘vegetation where the dominant canopy has >70% of the height and >50% of the cover relative to the undisturbed height and cover of that stratum’ and is dominated by species characteristic of the vegetation’s undisturbed canopy. Only vegetation that falls within this definition is mapped as a remnant regional ecosystem. Mapped regional ecosystems define vegetation that has not been cleared or has been lightly thinned, and vegetation that has been cleared or heavily thinned but substantially regrown.

### Project survey effort

The first stage of vegetation surveys verified the area of regional ecosystems consistent with the Semi-evergreen vine thickets TEC and included 79 quaternary and 32 secondary/tertiary sites undertaken in accordance with Queensland Herbarium survey methodology (Neldner et al. 2005).

## Occurrence within the project area

Semi-evergreen vine thicket TEC within the project area is represented by regional ecosystems 11.8.6 and 11.9.4, as well as areas of high value regrowth of RE 11.8.6. The area of Semi-evergreen vine thickets TEC within the project area was estimated to be 194ha.



## Impacts of the proposed action

An estimated 51ha of Semi-evergreen vine thickets TEC would be impacted by the project. Impacts would include direct clearing, fragmentation, and potential weed invasion.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measures relevant to Semi-evergreen vine thicket TEC:

- detailed design to avoid areas of Semi-evergreen vine thickets TEC, by amendment of infrastructure layout and small changes to mine pit boundaries
- pre-clearance surveys to further delineate the extent and condition of the Semi-evergreen vine thickets TEC to inform rehabilitation trials and offset management plans
- demarcation of clearing boundaries
- maximum use of existing cleared areas for construction
- seed collection
- stockpiling of topsoil
- weed management
- rehabilitation trials
- monitoring
- education of staff and contractors on location, type and importance of Semi-evergreen vine thickets TEC in the project area
- preparation and implementation of an offset management plan.

## Residual impact

The proposed action would impact on 51ha of Semi-evergreen vine thickets TEC.

## Cumulative impact

XCQ did not assess the cumulative impacts on Semi-evergreen vine thickets TEC.

## Offsets

XCQ proposed to offset the residual impact to the Semi-evergreen vine thickets TEC. Although Semi-evergreen vine thicket does not occur within XCQ's preferred offset property, a desktop assessment identified 27,287ha of potential Semi-evergreen vine thicket TEC offset area within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advice

### Conservation advice

There is no approved conservation advice for the Semi-evergreen vine thickets TEC.

### Threat abatement plan

There are no threat abatement plans relevant to Semi-evergreen vine thickets TEC.

### Recovery plan

National Recovery Plan for the Semi-evergreen vine thickets TEC.

The approved National Recovery Plan provides a detailed overview of the description, conservation status, distribution and ecology of the Semi-evergreen vine thickets TEC. The main threats to the TEC, research priorities and priority conservation actions are listed. The recovery plan identifies that the most serious threats to the Semi-evergreen vine thickets TEC in the northern areas are fire and invasive plant followed by the impact of grazing animals and ongoing clearing and fragmentation.

The priority recovery and threat abatement actions required for the Semi-evergreen vine thickets TEC (based on the recovery plan) are listed below:

- complete and refine mapping of remnant Semi-evergreen vine thickets TEC

- determine the extent and condition of areas of the Semi-evergreen vine thickets TEC affected by invasive plant species, particularly weeds of national significance e.g. rubber vine and lantana
- survey poorly known species associated with Semi-evergreen vine thickets TEC, especially fungi, herpetofauna and invertebrates
- monitor selected populations of threatened species across their distribution within the Semi-evergreen vine thickets TEC
- identify key areas of the Semi-evergreen vine thickets TEC for addition to the Queensland and NSW conservation reserve systems
- encourage landholders to enter into conservation agreements over Semi-evergreen vine thickets
- liaise with landholders to develop appropriate burning practices and other procedures to minimize fire damage to remnant areas on private and public lands
- determine the impact of grazing animals, both domestic and native, on remnant areas of Semi-evergreen vine thickets TEC and develop guidelines and recommendations for fencing
- develop and implement a pest management program to control or manage feral animals and native animals in Semi-evergreen vine thicket remnants
- encourage landholders through appropriate incentive programs to protect and foster regrowth and associated vegetation in buffer areas
- research and develop use of Semi-evergreen vine thicket species for landscape rehabilitation and encourage mining companies, main road managers and others to use native species in plantings
- undertake consultation with traditional owner groups to determine the level of indigenous knowledge of and association with the Semi-evergreen vine thickets TEC
- develop and implement education programs to increase the awareness of government and non-government organisations regarding Semi-evergreen vine thickets TEC conservation and their responsibilities for protection and management.

The approved recovery plan has been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ proposed a number of mitigation and management measures to reduce the level of impact to Semi-evergreen vine thickets TEC, including pre-clearance surveys, avoidance and minimisation of disturbance where possible, rehabilitation trials, and targeted weed control measures. Residual impacts to the semi-evergreen vine thickets TEC must be offset in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on Semi-evergreen vine thickets TEC.

## A tufted grass *Aristida annua*

### EPBC Act Status: vulnerable

#### Description

*Aristida annua* occurs is an annual loosely tufted grass growing to approximately 50cm in height which flowers between March and June. The species occurs in eucalypt woodland and is restricted to black clay soils, basalt soils and possibly disturbed sites. The species is known to occur in the Natural grasslands of the Queensland Central Highlands and the northern Fitzroy Basin ecological community.

#### Distribution

The species is restricted to central Queensland, in the Emerald and Springsure districts.

## Survey requirements and survey effort

### EPBC Act survey requirements/techniques

There are no specific guidelines for survey timing or requirements, however grasses are best surveyed in the late summer/early autumn following the wet season when grasses are in seed allowing positive identification of species.

### Project survey effort

Surveys for threatened flora species were conducted within potential habitats in the project footprint in November 2012 and March 2013. The threatened flora survey methods were consistent with the random meander technique (Cropper, 1993) and were conducted when completing vegetation sites assessments as well as while traversing the project site.

## Occurrence within the project area

*Aristida annua* was not detected during EIS field surveys on the project site. However, suitable habitat in the form of black soil plains occurs within the project area. Regional ecosystems within the project area representing potential habitat include 11.8.5, 11.8.11, 11.4.4 and 11.3.21. An estimated 5,547ha of potential habitat occurs within the project area.

## Impacts of the proposed action

If *Aristida annua* was found to occur within the impact area, the population would incur the loss of individual plants and fragmentation of the population.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measures relevant to *Aristida annua*:

- collection of genetic material (seed/cuttings) if the species was identified during the preconstruction phase
- stockpiling of top soil likely to contain seed for usage in rehabilitation areas as soon as possible (as long as that topsoil is free of weed species)
- monitoring of species recovery after rehabilitation
- management of weed threats, especially exotic grasses
- investigation of conservation arrangements
- implementation of appropriate fire and land management in surrounding areas.

## Residual impact

The proposed action would impact on 3,452ha of potential *Aristida annua* habitat.

## Cumulative impact

XCQ did not assess the cumulative impacts on *Aristida annua*.

## Offset

XCQ proposed to offset the potential impacts to *Aristida annua* and identified 4,477ha of *Aristida annua* habitat within their preferred offset site of Meteor Downs. XCQ also identified 316,401ha of potential *Aristida annua* offset areas within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advices

### Conservation advice

Approved Conservation Advice for *Aristida annua* (a tufted grass) was approved on 11 April 2014.

### Recovery plan

No recovery plan has been prepared for *Aristida annua*.

### Threat abatement plans

There are no relevant threat abatement plans for *Aristida annua*.

The main threats identified in the conservation advice are conversion of natural grassland to exotic pasture and cultivation of the exotic fodder tree – *Leucaena leucophala*. Persistent heavy grazing and mining development in the Bowen Basin are additional threats. Priority actions and threat abatement actions identified by the conservation advice are to monitor the known occurrences and identify key threats and progress of their recovery, control pasture improvement at known sites, protect populations through conservation arrangements, manage grazing to only occur outside growing season, intermittent grazing in preference to grazing and raise community awareness of the species within the local community.

The approved conservation advice has been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ proposed a number of mitigation and management measures to reduce the level of impact to *Aristida annua* (if present) including pre-clearance surveys, planting of the species in rehabilitation, and targeted weed control measures. Residual impacts to *Aristida annua* must be offset in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the listed threatened species *Aristida annua*.

---

## King blue-grass (*Dichanthium queenslandicum*)

### EPBC Act Status: endangered

*Dichanthium queenslandicum* (king blue-grass) is a perennial grass, growing to 80cm tall. Culms are solitary or rarely branched, erect, glabrous, smooth with a single groove, 4 to 5 noded with nodes prominently hairy. Leaf sheaths are hirsute with the hairs arising from wart-like projections. Inflorescences are single racemes of paired spikelets to 10cm long. Sessile spikelets are bisexual, dorsally compressed, and straw-coloured to pale mauve. Pedicelled spikelets are male and straw-coloured to pale mauve.

### Distribution

King blue-grass occurs within the South Eastern Queensland, Brigalow Belt South, Brigalow Belt north, Central Mackay Coast, Desert Uplands, Mitchell Grass Downs and Einasleigh Upland Bioregions; and the South East Queensland, Condamine, Border Rivers Maranoa-Balonne, Burnett Mary, Fitzroy, Burdekin, Mackay Whitsunday, Southern Gulf and Desert Channels Natural Resource Management Regions.

The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities:

- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- Weeping Myall woodlands
- Natural grasslands on basalt and fine-textured alluvial plains of northern New South Wales and southern Queensland
- Natural Grasslands of the Queensland Central Highlands and the northern Fitzroy Basin.

## Survey requirements and survey effort

### EPBC Act survey requirements/techniques

There are no specific guidelines for survey timing or requirements, however grasses are best surveyed in the late summer/early autumn following the wet season when grasses are in seed allowing positive identification of species.

### Project survey effort

Surveys for threatened flora species were conducted within potential habitats in the project footprint in November 2012 and March 2013. The threatened flora survey methods were consistent with the random meander technique (Cropper, 1993) and were conducted when completing vegetation sites assessments as well as while traversing the project site.

## Occurrence within the project area

King blue-grass was not recorded during the field surveys but it has been collected only 700m to the north of the site and to the east within Albinia National Park. Suitable habitat occurs within the project area and is represented by regional ecosystems – 11.3.21, 11.4.4 and 11.8.11. King blue grass is likely to occur in non-remnant areas with heavy cracking clay soils. An estimate 1,751ha of potential king blue grass habitat occurs within the project area.

## Impacts of the proposed action

Should king blue grass occur within the impact area, the population would be at risk of loss of individual plants, fragmentation, and competition from introduced weeds.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measures relevant to king blue-grass:

- collection of genetic material (seed/cuttings) if the species is identified in the pre-construction phase
- stockpiling of top soil that is likely to contain seed and use for rehabilitation (as long as topsoil is free of weed seed)
- management of weed threats, especially exotic grasses
- investigation of conservation arrangements
- appropriate fire and land management
- species specific management action (i.e. translocation and/or propagation).

## Residual impact

The proposed action would impact on 1,112ha of king blue-grass habitat.

## Cumulative impacts

XCQ considered the cumulative impacts on king blue grass to be not significant.

## Offsets

XCQ proposed to offset the loss of 1,112ha of potential king blue grass habitat. XCQ identified 1,787ha of potential king blue grass offset within their preferred offset location of Meteor Downs. A desktop assessment identified 141,999ha of potential king blue grass offset area within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advice

### Recovery plan

A recovery plan has not been prepared for king blue-grass.

### Threat abatement plan

There are no threat abatement plans relevant to king blue-grass.

### Conservation advice

Commonwealth Conservation Advice for *Dichanthium queenslandicum* (king blue-grass) was approved by the Minister on 20 January 2013.

The approved conservation advice provides a detailed overview of the description, conservation status, distribution and habitat for king blue grass. The main threats to the species, research priorities and priority conservation actions are listed. The conservation advice identifies that the main threats to the species are loss of habitat through agricultural and mining activities, road construction and other infrastructure developments. Cultivation and crop production, grazing and weed invasion from parthenium (*Parthenium hysterophorus*) and parkinsonia (*Parkinsonia aculeata*) are on-going threats.

The priority actions for king blue-grass (based on the conservation advice) are listed below:

### **Habitat loss, disturbance and modification**

- monitor known populations to identify key threats
- monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary
- identify populations of high conservation priority
- ensure there is no disturbance in areas where king blue-grass occurs, excluding necessary actions to manage the conservation of the species/ecological community
- investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate and/or secure inclusion in reserve tenure if possible
- manage any other known, potential or emerging threats, including mining practices, grazing, weed invasion and climate change

### **Invasive weeds**

- develop and implement a management plan for king blue-grass for the control of parthenium (*Parthenium hysterophorus*) and parkinsonia (*Parkinsonia aculeata*) in the region
- ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on king blue-grass

### **Trampling, browsing or grazing**

- develop and implement a stock management plan for roadside verges and travelling stock routes

### **Conservation information**

- raise awareness of king blue-grass within the local community, for example distribute fact sheets/information brochures or conduct field days in conjunction with known industry or community interest groups
- engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions
- enable recovery of additional sites and/or populations
- undertake appropriate seed collection and storage
- investigate options for linking, enhancing or establishing additional populations
- implement national translocation protocols if establishing additional populations is considered necessary and feasible.

The approved conservation advice has been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## **Conclusion**

XCQ has proposed a number of mitigation and management measures to reduce the level of impact to *Dichanthium queenslandicum* (if present) including pre-clearance surveys, planting of the species in rehabilitation, and targeted weed control measures. Residual impacts to *Dichanthium queenslandicum* must be offset in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the listed threatened species *Dichanthium queenslandicum*.

---

## **Bluegrass (*Dichanthium setosum*)**

### **EPBC Act Status: vulnerable**

### **Description**

It is an upright perennial grass less than 1m tall. It has mostly hairless leaves about 2-3mm wide. The flowers are densely hairy and clustered together along a stalk in a cylinder shape and appear mostly during summer. The species can form pure swards or occur as scattered clumps.

*Dichanthium setosum* is associated with heavy basaltic black soils and stony red-brown hard-setting loam with clay subsoil and is found in moderately disturbed areas such as cleared woodland, grassy roadside remnants, grazed land and highly disturbed pasture. The extent to which this species tolerates disturbance is unknown.

#### Distribution

The distribution of this species overlaps with the following EPBC Act-listed threatened ecological communities:

- Semi-evergreen vine thickets of the Brigalow Belt
- the community of native species dependent on natural discharge of groundwater from the Great Artesian Basin
- Bluegrass (*Dichanthium spp.*) dominant grasslands of the Brigalow Belt bioregions
- Brigalow (*Acacia harpophylla* dominant and co-dominant)
- White Box-yellow box-Blakely red gum grassy woodland and derived native grassland
- Upland wetlands of the New England Tablelands and the Monaro plateau.

In Queensland, it has been reported from the Leichhardt, Morton, North Kennedy and Port Curtis regions.

## Survey requirements and survey effort

### EPBC Act survey requirements/techniques

There are no specific guidelines for survey timing or requirements, however grasses are best surveyed in the late summer/early autumn following the wet season when grasses are in seed allowing positive identification of species.

### Project survey effort

Surveys for threatened flora species conducted within potential habitats in the project footprint in November 2012 and March 2013. The threatened flora survey methods were consistent with the random meander technique (Cropper, 1993) and were conducted when completing vegetation sites assessments as well as while traversing the project site.

## Occurrence within the project area

*Dichanthium setosum* was not recorded during the field surveys but could potentially occur. Suitable regional ecosystems within the project area include 11.3.21, 11.4.4 and 11.8.11. The species can also occur in areas of non-remnant vegetation, especially on heavy clay soils. *Dichanthium setosum* was recorded on the adjacent Albinia National Park. An estimated 1,751ha of potential habitat occurs within the project area.

## Impacts of the proposed action

The proposed action could result in the loss of individual plants and fragmentation of populations.

## Avoidance and Mitigation Measures

XCQ proposed the following mitigation and management measures relevant to blue grass:

- collection of genetic material (seed/cuttings) if the species is identified in the pre-construction phase
- stockpiling of top soil that is likely to contain seed and use for rehabilitation ( as long as topsoil is free of weed seed)
- management of weed threats, especially exotic grasses
- investigation of conservation arrangements
- appropriate fire and land management
- species specific management action (i.e. translocation and/or propagation).

## Residual impacts

The proposed action would impact on 1,112ha of *Dichanthium setosum* habitat.

## Cumulative impacts

XCQ considered the cumulative impacts on blue grass to be not significant.

## Offsets

XCQ proposed to offset impacts to *Dichanthium setosum* and identified 1,806ha of potential offset within their preferred offset property of Meteor Downs. A desktop assessment of offset availability identified 254,723ha of potential *Dichanthium setosum* offset areas within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advices

### Conservation advice

Commonwealth conservation advice for *Dichanthium setosum* was approved by the Minister on 26 March 2008.

### Recovery Plan

No recovery plan has been prepared for Bluegrass (*Dichanthium setosum*).

### Threat abatement plans

There are no threat abatement plans relevant to Bluegrass (*Dichanthium setosum*).

The main threats identified in the approved conservation advice are heavy grazing by domestic stock; loss of habitat through clearing for pasture improvement and cropping, frequent fires, invasion by introduced grasses and road widening.

The priority actions for blue grass (based on the conservation advice) are listed below:

### Habitat loss, disturbance and modification

- Identify populations of high conservation priority.
- Manage threats to areas of vegetation that contain populations/occurrences/remnants of *Dichanthium setosum*.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on *Dichanthium setosum*.
- Ensure road widening and maintenance activities (or other infrastructure or development activities as appropriate) in areas where *Dichanthium setosum* occurs do not adversely impact on known populations.
- Investigate formal conservation arrangements such as the use of covenants, conservation agreements or inclusion in reserve tenure.

### Invasive weeds

- Develop and implement a management plan for the control of introduced grasses, such as Coolatai, African lovegrass and Lippia, in the local region.

### Trampling, browsing or grazing

- Develop and implement a stock management plan for roadside verges and travelling stock routes.

### Fire

- Develop and implement a suitable fire management strategy for *Dichanthium setosum*.
- Identify appropriate intensity and interval of fire to promote seed germination.
- Provide maps of known occurrences to local and state Rural Fire Services and seek inclusion of mitigation measures in bush fire risk management plans, risk register and/or operation maps.

### Conservation information

- Raise awareness of *Dichanthium setosum* within the local community, particularly among landholders.

The priority management actions identified in the approved conservation advice have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ has proposed a number of mitigation and management measures to reduce the level of impact to blue grass including pre-clearance surveys, planting of the species in rehabilitation, and targeted weed control measures. XCQ must offset residual significant impacts to the species in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on blue grass.



---

## **Black-breasted button-quail (*Turnix melanogaster*)**

### **EPBC Act listing: vulnerable**

#### **Description**

The black-breasted button-quail is a large, plump, pale-eyed button-quail. It is similar in size to the painted button-quail. The male black-breasted button-quails are about 18cm long, with a wingspan of 32-35cm, and weighing 65g. The females are larger, weighing 100g. The sexes differ in plumage, and there is no seasonal variation. Males have finely patterned backs and wings with brown, black, grey and white mottling. The face and throat are whitish and the breast is black with numerous white half-moon markings. The female is similar in all respects except for having a black face and throat, a larger dark area over the upper and lower breast and heavier white half-moon markings on the upper and lower breast. The bill is grey and the legs are pale yellow. Juveniles resemble males but are duller.

Black-breasted button quail are commonly seen in pairs or occasionally in small groups. Being territorial, females are occasionally seen singly.

#### **Distribution**

The black-breasted button-quail is endemic to eastern Australia. It is restricted to coastal and near-coastal regions of south-eastern Queensland and north-eastern New South Wales. The main populations occur within south-east Queensland.

Present-day known distribution in Queensland extends from near Byfield in the north, south to the New South Wales border and westwards to Palm Grove National Park and Barakula State Forest. The extent of occurrence is estimated to be approximately 5200km<sup>2</sup>, but this estimate is only of medium reliability. In Queensland there have been few recent records from much of the Rockhampton and Dawson river areas.

The black-breasted button-quail is restricted to rainforests and forests, mostly in areas with 770-1200mm rainfall per annum. They prefer drier low closed forests, particularly semi-evergreen vine thickets, low microphyll vine forest, araucarian vine forest and araucarian notophyll vine forest.

#### **Survey requirements and survey effort**

##### **EPBC Act survey requirements/techniques**

Recommended methods – area searches of suitable habitat with detection of flushing birds or hearing of foraging scratching. Also search for platelets, although not conclusive unless birds also sighted. In areas of less than 50ha, land-based searches of 15 hours/3 days are the recommended search effort.

##### **Project survey effort**

Surveys were carried out in November 2011 and December 2012 within suitable black-breasted button quail habitat. The November survey consisted of: detailed bird survey at one site of one person hour over one day; bird surveys and searches for platelets and distinctive pellets at five sites of 10 person hours; and twice daily observations in suitable habitat (early morning and evening). The December survey consisted of: a detailed bird survey at one site of one person hour over five days; spotlighting at one site over three nights of two person hours; and one-off opportunistic surveys at six sites by two person hours.

EHP considers the survey method and effort to be adequate with respect to the EPBC Act threatened bird survey guidelines.

#### **Occurrence within project area**

Black-breasted button quail were recorded at 2 locations within the project area in semi-evergreen vine thicket by identification of platelets and pellets. An estimated 194ha of habitat occurs within the project area.

#### **Impacts of the proposed action**

The proposed action would result in:

- loss of 51ha of black-breasted button quail habitat
- predation by feral animals

- loss of nesting habitat due to the establishment of weeds.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measure relevant to black-breasted button quail:

- clearing of areas of semi-evergreen vine thickets TEC would be avoided when black-breasted button quail are nesting from April to May.

## Residual impact

The proposed action would impact on 51 ha of black-breasted button-quail habitat. XCQ assessed the impact to be significant due to the importance of the population, clearance of a substantial area of the isolated critical habitat, the unknown size of the population within the project area, and the likely isolation of the population.

## Cumulative impacts

XCQ did not consider the cumulative impacts on black-breasted button-quail.

## Offsets

XCQ proposed to offset the impacts to black-breasted button-quail habitat. Although no suitable habitat occurs within their preferred offset property, a desktop assessment identified 37,226ha of potential black-breasted button-quail offset area within a 200km radius of the project area.

## Consideration of Plans/Agreements/Conservation Advices

### Recovery Plan

National recovery plan for the black-breasted button-quail *Turnix melanogaster* (2009).

### Threat abatement plans

- Threat abatement advice for predation, habitat degradation, competition and disease transmission by feral pigs (2013)
- Threat Abatement Plan for predation by feral cats
- Threat Abatement Plan for Predation by the European Red Fox

The main threats to black-breasted button-quail identified in the recovery plan include:

- loss of habitat and habitat fragmentation due to clearing for a range of purposes
- habitat degradation as a result of domestic stock and feral pigs utilising black-breasted button-quail habitat
- habitat loss or degradation due to inappropriate fire regimes
- predation by feral animals.

The following priority recovery and threat abatement actions are identified in the recovery plan to support the recovery of black-breasted button-quail:

- consolidate current knowledge and define assessment and monitoring strategies for black-breasted button-quail, including an assessment of current status throughout its range and a clear definition of the habitats occupied by the species:
  - collate in a database, critically analyse (verify) and map existing black-breasted button-quail site data
  - map existing data on black-breasted button-quail distribution and habitat requirements and develop a predictive model of the 'species' distribution
  - document a useful model of finding and recording black-breasted button-quail for observers
  - survey habitat where the species' occurrence is possible but has not yet been detected
- protect key ecosystems and habitat that support black-breasted button-quail from human-induced threatening processes, thus maintaining current populations and habitat:
  - review and promote management guidelines to ameliorate impacts from human activities (housing land development, water infrastructure development, timber harvesting, fire and stock management) on identified black-breasted button-quail habitat
  - regulate land use by state and local authorities

- conduct a census during the final year of the life of this recovery plan using guide produced
- maintain or improve the extent, condition (quality) and connectivity of black-breasted button-quail habitat:
  - investigate and instigate (where appropriate) protection of habitat through nature refuge system and/or other instruments of protection
  - establish extension activities with land managers and private landholders
  - rehabilitate degraded habitats
- reduce the impacts of introduced predators and competitors:
  - investigate feral (dog, cat, pig, fox) control program
  - implement feral (dog, cat, pig, fox) control program
  - ameliorate effects of domestic stock on black-breasted button-quail and its habitat
- increase understanding of the ecology of black-breasted button-quail:
  - design and implement research projects to enhance understanding of the species
  - develop and maintain community network
  - ensure traditional owner communities are involved in the recovery effort
- administer and review the operation of the recovery process:
  - coordinate the recovery process effectively
  - review of the recovery process throughout the life of the plan.

These threat abatement plans focus on the risk to species from feral and pest species. They set out a national framework to guide and coordinate Australia's response to the impacts of cats and foxes on biodiversity to protect affected species and prevent further species being affected.

The broad goals of the Threat Abatement Plan for Feral Pigs is to protect nationally listed threatened species and communities from predation, habitat degradation, competition and disease transmission by feral pigs. The objectives of the plan are to:

- prevent feral pigs from establishing in areas where they do not currently occur or are in low eradicable numbers, and where they would impact on nationally listed threatened species and ecological communities
- integrate feral pig management plans and their implementation into natural resource planning and investment at the regional, state and territory and federal level through consultation and liaison with key stakeholders
- increase awareness and understanding of land managers and the general community about the damage that feral pigs cause and management options
- quantify the impacts that feral pigs have on biodiversity (especially nationally listed threatened species and ecological communities) and determine the relationship between feral pig density and the level of damage
- improve the effectiveness, efficiency and humaneness of techniques and strategies for managing the environmental damage due to feral pigs.

The objectives of the Threat Abatement Plan for predation by feral cats are to prevent feral cats occupying new areas, promote the maintenance and recovery of species affected by feral cats, improve knowledge and understanding, improve effectiveness of control operations and increase awareness.

The objectives of the Threat Abatement Plan for predation by the European Red Fox are to prevent red foxes occupying new areas, promote the maintenance and recovery of native species and communities that are affected, improve knowledge and understanding of red fox impacts and interactions with species and ecological processes, improve effectiveness of control options and increase awareness.

The priority management actions identified in the approved recovery plan, and the threat abatement plans, have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ proposed to reduce the impact to the black-breasted button-quail by scheduling clearing of habitat to avoid the nesting season. XCQ must offset residual significant impacts to the species in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the black-breasted button-quail.

## Australian painted snipe (*Rostratula australis*)

### EPBC Act Status: endangered

#### Description

The Australian painted snipe (*Rostratula australis*) is a stocky wading bird around 220-250mm in length with a long pinkish bill. The adult female, more colourful than the male, has a chestnut-coloured head, with white around the eye, white crown stripe, and metallic green back and wings barred with black and chestnut. There is a pale stripe extending from the shoulder into a V down its upper back. The adult male is similar to the female, but smaller and duller with buff spots on the wings.

#### Distribution

The Australian painted snipe is usually found in shallow inland wetlands, either freshwater or brackish, that are either permanently or temporarily filled. It is a cryptic bird that is hard to see and often overlooked. Usually only single birds are seen, though larger groups of up to 30 have been recorded. It nests on the ground amongst tall reed-like vegetation near water, and feeds near the water's edge and on mudflats, taking invertebrates, such as insects and worms, and seeds.

Although the Australian painted snipe can occur across Australia, the areas of most sensitivity to the species are those wetlands where the birds frequently occur and are known to breed. It has always only occurred in limited numbers in Australia, but substantial declines in numbers have been noted since European settlement, in particular, over the last 30-50 years.

#### Survey requirement and survey effort

Survey Guidelines for Australia's Threatened Birds. EPBC Act survey guidelines 6.2

##### EPBC survey requirements/techniques

Area searches or transects through suitable wetlands; detection by sighting and flushing. Targeted stationary observations at dawn and dusk of suitable foraging locations within wetlands; detection by sighting. Also a brief spotlight search shortly after dusk may detect birds. To date, trials of broadcast (playback) have not been successful. Required survey effort as follows:

- a total of 10 hours of targeted stationary observations over 5 days or
- 10 hours land-based area or transect searches over 3 days.

The above survey effort is for an area of 50ha. Some modification is required for larger sites within consideration to be given to the variety of landforms and vegetation types present. Surveys should be conducted when wetlands hold water but are not flooded.

#### Occurrence within project area

The Australian painted snipe was recorded at one wetland during fauna surveys. There are a number of wetlands, both natural and artificial within the project area. An estimated 115ha of potential habitat occurs within the project impact area.

#### Impacts of the proposed action

The proposed action would result in:

- potential habitat loss of 23ha
- displacement of nesting birds due to disturbance
- predation by feral animals
- loss of nesting and foraging habitat due to the establishment of weeds
- direct mortality during construction and operation
- nest destruction during clearing.

## **Avoidance and mitigation measures**

XCQ proposed only general measures to address fauna mortality, with no measures specific to reducing impacts to Australian painted snipe or its habitat.

## **Residual impact**

The proposed action would impact on 23ha of Australian painted snipe habitat. XCQ assessed the risk of a significant impact as unlikely due to the low magnitude of change to the species distribution.

## **Cumulative impacts**

XCQ considered that the cumulative impact on Australian painted snipe to be not significant.

## **Offsets**

XCQ did not propose to offset impacts to Australian painted snipe habitat based on a determination that the impact would not be significant.

## **Consideration of Plans/ Agreement/Conservation Advice**

### **Conservation advice**

Commonwealth conservation advice for *Rostratula australis* (Australian Painted Snipe) was approved by the Minister on 30 May 2013.

### **Recovery plan**

No recovery plan has been prepared for the Australian painted snipe.

### **Threat abatement plans**

There are no threat abatement plans relevant to the Australian painted snipe.

The main threats identified in the approved conservation advice include: loss and degradation of wetlands through drainage and the diversion of water for agriculture and reservoirs; grazing and the associated trampling of wetland vegetation/nests; and nutrient enrichment and disturbance to substrate by livestock, especially where grazing is concentrated around wetlands during dry seasons. Predation by foxes or cats may also be a threat. Additional threats include: coastal port and infrastructure development, shale oil mining and replacement of native wetland vegetation by invasive weeds.

The following priority recovery and threat abatement actions could support the recovery of the Australian painted snipe:

### **Habitat loss, disturbance and modification**

- Develop management guidelines for breeding and non-breeding habitat.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Ensure there is no disturbance in areas where the species is known to breed, excluding necessary actions to manage the conservation of the species.
- Control access routes to suitably constrain public access to existing and future breeding sites on public land.
- Suitably control and manage access on private land and other land tenure.
- Minimise adverse impacts from land use at known sites.
- Manage any changes to hydrology that may result in changes to water table levels, run-off, salinity, algal blooms, sedimentation or pollution.
- Manage any disruptions to water flows.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate/secure inclusion in reserved tenure if possible.
- Manage any other known, potential or emerging threats including inappropriate fire regimes and coastal port/infrastructure development.

### **Invasive weeds**

- Implement the parkinsonia strategic plan for the control of this species within the range of the Australian painted snipe.
- Identify and remove weeds in wetland areas that could become a threat to the Australian painted snipe, using appropriate methods.
- Ensure chemicals or other mechanisms used to eradicate weeds do not have a significant adverse impact on the Australian painted snipe.

### **Trampling, browsing or grazing**

- Develop and implement a stock management plan for roadside verges and travelling stock routes which include swamps, marshes or wetlands.
- If livestock grazing occurs in known Australian painted snipe habitats, ensure land owners/managers use an appropriate management regime and density that does not detrimentally affect Australian painted snipe nesting sites.
- If appropriate, manage total grazing pressure at important breeding sites through exclusion fencing or other barriers.

### **Animal predation or competition**

- Implement the national threat abatement plans for the European red fox and feral cats to control the adverse impacts of foxes (*Vulpes vulpes*) and cats (*Felis catus*) in the species' range.
- Continue baiting to control population numbers of feral animals.

### **Fire**

- Develop and implement a suitable fire management strategy for the habitat of the Australian painted snipe.

### **Conservation information**

- Raise awareness of the Australian painted snipe within the local community and the importance of reporting observations to BirdLife Australia, using fact sheets and/or brochures.
- Advertise and encourage use of Australian painted snipe survey techniques and survey forms
- Organise field days with industry and interest groups to raise awareness and share information on the species. These groups may include natural resource management groups, catchment management authorities, Indigenous groups, conservation organisations, local and state governments, and private landholders.
- Engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.
- Raise awareness of banded individuals to increase the likelihood of re-sighting and reporting.
- Facilitate the exchange of information between interested parties, including sightings, research and management approaches.

The priority management actions identified in the approved recovery plan have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

### **Conclusion**

XCQ has not proposed any specific measures to reduce the impact to the Australian painted snipe, only general measures to limit fauna injury. XCQ did not propose to offset residual impacts to the species in accordance with the EPBC Act Offsets Policy on the basis that the impacts were assessed as not significant.

EHP agrees that the impact on the Australian Painted Snipe is not significant and therefore an offset for impacts to its habitat is not required.

A species management plan for Australian painted snipe should be undertaken that is consistent with the relevant recovery plan, threat abatement plan and conservation advice and must include measures to ensure that there is no net loss of habitat for Australian painted snipe as a result of impacts to wetlands or water quality within the project area.

## **Squatter pigeon (southern) *Geophaps scripta scripta***

### **EPBC Act Status: vulnerable**

#### **Description**

The squatter pigeon (southern) is a medium-sized (approximately 30cm long) ground-dwelling pigeon. Adults of both sexes are mostly grey-brown with black and white stripes on the face and throat, iridescent green or violet patches on the wings, a blue-grey lower breast and white flanks and lower belly. The two identified sub-species differ in the colouring of the facial skin – *G.s.scripta* has blue-grey orbital skin.

#### **Distribution**

The squatter pigeon (southern) occurs on the inland slopes of the Great Dividing Range, with a distribution that extends from the Burdekin-Lynd divide in central Queensland, west to Charleville and Longreach, east to the coast from Proserpine to Port Curtis, and south to scattered sites in south-eastern Queensland. The subspecies, which is suspected to occur as a single, contiguous breeding population, mostly inhabits grassy woodlands and open forest dominated by eucalypts. The squatter pigeon (southern) is considered to be resident in at least some parts of its range, but also appears to undertake some local movements.

#### **Survey requirements and survey effort**

Survey Guidelines for Australia's Threatened Birds. EPBC Act survey guidelines 6.2

#### **EPBC Act survey requirements/techniques**

##### **Desktop assessment**

Surveys for the squatter pigeon (southern) should commence with a desktop assessment of the geographical area of potential foraging, breeding or dispersal habitat for the subspecies. The desktop assessment of this study area provides the information necessary to locate and design on-ground habitat assessments, opportunistic surveys and targeted surveys for the subspecies.

A desktop assessment should provide general information about the known distribution of squatter pigeons, where potential habitat and habitat connectivity occurs, and where important populations or habitat critical to the survival of the subspecies may occur in relation to the study area. This preliminary assessment should include searches of squatter pigeon (southern) records in state and non-government databases a review of the scientific literature, and a review of current vegetation mapping and aerial photographs of the study area.

##### **Habitat assessment**

Habitat assessments must be conducted by suitably qualified botanists or ecologists with demonstrated skill and experience in squatter pigeon (southern) habitat assessments.

If any vegetation types, which are indicative of the subspecies' foraging, breeding or dispersal habitat, are identified in the desktop assessment, an on-ground habitat assessment will need to be conducted. The distribution of each vegetation type and the quality of potential habitat areas for squatter pigeon foraging, breeding or dispersal should be assessed, as much as practicable, in each vegetation type. With regards to larger study areas, a reconnaissance of each vegetation type and subsequent stratification of the sampling effort will need to be conducted. It is recommended that opportunistic surveys for the subspecies be conducted during habitat assessments, particularly along dusty roads and other patches of bare ground adjacent to areas of native vegetation identified as suitable for the subspecies' foraging, breeding or dispersal.

##### **Targeted surveys**

Targeted surveys for the squatter pigeon (southern) are required to detect the subspecies in suitable habitats and to identify how the subspecies may be using those areas of habitat. Surveys must be conducted by suitably qualified zoologists or ecologists with demonstrated skill and experience in conducting squatter pigeon (southern) surveys, and must be undertaken in a manner which maximises the chance of detecting the species.

##### **Optimal conditions**

The optimal period of the year to detect the squatter pigeon (southern) is during the mid to late dry season from May to the end of October when the subspecies is most actively foraging for grass seed. The optimal period to observe juvenile squatter pigeons, which will indicate the presence of breeding habitat in the area, is in June.

As a general rule, targeted surveys should not be undertaken during weather conditions which are likely to impair visual detection of the subspecies, such as high windy conditions or during the night. Squatter pigeons are most commonly detected between sunrise and 9 am and between 3:30 pm and sunset. The optimal times of day to detect squatter pigeons are in the first half hour after sunrise and the last half hour before sunset when the birds are most active.

### **Targeted survey methods**

Squatter pigeons are difficult to detect in their natural habitat, but are commonly seen foraging for seed on bare, dusty ground adjacent to natural habitats. The subspecies often occurs around dirt tracks and frequents water bodies or water courses from dawn to the middle of the morning and from the middle of the afternoon to dusk. Close inspection of dirt tracks and waterholes by surveyors tends to increase the chance of detection.

Commencing targeted surveys with slow driving surveys along roads and dusty areas is the most efficient way of detecting the subspecies. Driving in a vehicle at a constant speed (approximately 20 km per hour) along these roads is likely to be 'flush' squatter pigeons from their positions on the ground, which should allow the detection of the subspecies. Two driving surveys should be conducted in the following manner:

- along the same route, in the same manner, on consecutive days
- adjacent to areas of natural habitat throughout the study area
- along unsealed roads, tracks and other dusty areas, such as stockyards
- along sealed roads around the perimeter of the study area.

The route to be taken should be designed to:

- survey all unsealed roads in the study area during the periods, sunrise to 9.00am and from 3:30pm to sunset (i.e. commence the morning route at sunrise and then allow enough time in the afternoon to complete the afternoon survey by sunset)
- conduct return surveys along each road (i.e. survey a road then come back along the same road before proceeding to another).

It is recommended that waterbody surveys are conducted on the two consecutive days following the driving surveys. Waterbody surveys should target all natural and artificial waterbodies and watercourses which are suitable for use by the Squatter Pigeon (southern), and be conducted during the periods, sunrise to 9.00am and from 3:30pm to sunset.

Individuals tend to drink at the same, preferred location at the edge of a waterbody. It is recommended that observers position themselves so that they have a clear view of the subspecies' preferred drinking location. The observer must also be as still and quiet as possible to not disturb birds as they approach and drink. Therefore, the observer should be in position at the waterbody before birds are likely to arrive.

### **Project survey effort**

Bird surveys within the project area occurred in November 2011 and December 2012. The November surveys consisted of: a) detailed surveys at 3 sites with one day per site of 3 person hour effort each, b) bird surveys at 6 secondary sites with a 12 person hour effort and c) twice daily observations in suitable habitat (early morning and evening). The December surveys consisted of: a) detailed survey at one site over 5 days with an effort of 1 person hour, b) spotlighting at one site over 3 nights with an effort of 2 person hours and c) one-off surveys of 6 sites with an effort of 2 person hours.

EHP considers the survey effort and methods to be adequate to establish the presence of squatter pigeon (southern) within the project area.

### **Occurrence within project area**

Squatter pigeon (southern) was recorded at two locations during the fauna surveys. Potential habitat occurs throughout the project area in grassy woodland on alluvium, open woodland on igneous or sedimentary and riparian woodland. An estimated 2891ha of squatter pigeon habitat occurs within the project area.

### **Potential impacts of proposed action**

The proposed action would result in:

- the loss of 2891ha of squatter pigeon (southern) habitat
- predation by feral animals
- establishment of weeds that could result in loss of nesting and foraging habitat.



## Avoidance and mitigation measures

XCQ proposed only general measures to address fauna mortality, with no measures specific to reducing impacts to squatter pigeon (southern) or its habitat.

## Residual impact

The proposed action would result in the loss of 2891ha squatter pigeon (southern) habitat within the project area. XCQ determined that there would be a low risk of significant impact.

## Cumulative impacts

The proposed action and the adjacent Meteor Downs South project would result in the loss of 3159ha on squatter pigeon (southern) habitat. The provision of offsets would partially compensate for this loss of habitat and would likely reduce but not prevent the long-term decline of natural grasslands in the region.

## Offsets

XCQ did not propose to provide an offset for impacts to squatter pigeon (southern) habitat on the basis of the impact being assessed as not significant.

## Consideration of Plans/Agreement/Conservation advice

### Conservation advice

Commonwealth Conservation Advice for *Geophaps scripta scripta* (Squatter Pigeon (southern)) approved by the Minister on 3 July 2008.

### Recovery Plan

No recovery plan has been prepared for the squatter pigeon (southern).

### Threat Abatement Plans

The following threat abatement plans are relevant to the squatter pigeon (southern):

- Threat Abatement Plan for predation by feral cats
- Threat Abatement Plan for Predation by the European Red Fox
- Threat abatement plan to reduce the impacts of tramp ants on biodiversity in Australia and its territories.

The main threats identified in the approved conservation advice include: ongoing clearance of habitat for farming or development purposes, grazing of habitat by livestock and feral herbivores, and predation by feral cats and foxes.

The following priority recovery and threat abatement actions are identified in the conservation advice to support the recovery of the squatter pigeon:

### Habitat Loss, Disturbance and modification

- Monitor known populations to identify key threats.
- Monitor the progress of recovery, including the effectiveness of management actions and the need to adapt them if necessary.
- Identify populations of high conservation priority.
- Manage threats to areas of vegetation that support important populations of the squatter pigeon (southern).
- Protect populations of the listed subspecies through the development of covenants, conservation agreements or inclusion in reserved tenure.

### Trampling, browsing or grazing

- Develop and implement a stock management plan for key sites.
- Develop and implement a management plan, or nominate an existing plan to be implemented, for the control and eradication of feral herbivores in areas inhabited by the squatter pigeon (southern).

### Animal predation or competition

- Implement the appropriate recommendations outlined in the Threat Abatement Plan for Predation by Feral Cats and the Threat Abatement Plan for Predation by the European Red Fox in areas inhabited by the squatter pigeon (southern).

## Conservation Information

- Raise awareness of the squatter pigeon (southern) within the local community, particularly among land managers. The objectives of the Threat Abatement Plan for predation by feral cats are to prevent feral cats occupying new areas, promote the maintenance and recovery of species affected by feral cats, improve knowledge and understanding, improve effectiveness of control operations and increase awareness.

The objectives of the Threat Abatement Plan for predation by the European Red Fox are to prevent red foxes occupying new areas, promote the maintenance and recovery of native species and communities that are affected, improve knowledge and understanding of red fox impacts and interactions with species and ecological processes, improve effectiveness of control options and increase awareness.

The Threat Abatement Plan to reduce the impacts of tramp ants on biodiversity in Australia and its territories establishes a national framework to guide and coordinate Australia's response to tramp ants, identifying the research, management, and other actions necessary to ensure the long-term survival of native species and ecological communities affected by tramp ants. The plan contains six objectives, with supporting actions at all stages of the invasion sequence. The objectives are:

- Increase science-based knowledge and expertise, incorporate Indigenous traditional ecological knowledge, quantify impacts, and improve access to information for priority tramp ant species.
- Prevent entry and spread of tramp ants by increasing diagnostic capacity, offshore surveillance, inspection, treatment, and national and state and territory surveillance.
- Prepare for rapid response to tramp ant incursions and spread through risk assessment of tramp ant species and pathways of introduction, and development of contingency plans.
- Enhance emergency response to tramp ant incursions by improving reporting and response rates, and by developing tools for response and follow-up.
- Build stewardship by engaging, educating, and informing the Australian community about the impacts of invasive tramp ants and effective means of response.
- Coordinate Australian Government, state and territory government, and local management activities in Australia and the region.

The priority management actions identified in the approved conservation advice, and the threat abatement plans, have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ has not proposed any specific measures to reduce the impact to the squatter pigeon (southern), only general measures to limit fauna injury. XCQ did not propose to offset residual impacts to the species in accordance with the EPBC Act Offsets Policy on the basis that the impacts were assessed as not significant. However, DOE and EHP consider that significant impacts to foraging and breeding habitat for the squatter pigeon (southern) are likely to occur and therefore impacts to the areas of foraging and breeding habitat should be offset.

---

## Ornamental snake (*Denisonia maculata*)

### EPBC Act Status: vulnerable

### Description

The ornamental snake is a brown, grey-brown or black snake growing up to 50cm in length with lighter coloured body scales, often with darker streaks/flecks. The crown of the head is darker brown/black with lighter flecks; it has distinctly barred lips, a white/cream belly with dark spots/flecks on the outer edges, and smooth scales.

Ornamental snake's preferred habitat is within, or close to, habitat that is favoured by its prey – frogs. The species is known to prefer woodlands and open forests associated with moist areas, particularly gilgai (melon-hole) mounds and depressions in Queensland regional ecosystem land zone 4, but also lake margins and wetlands. Gilgai formations are found where deep-cracking alluvial soils with high clay contents occur. Ornamental snake is likely to be found in Brigalow (*Acacia harpophylla*), gidgee (*Acacia cambagei*), Blackwood (*Acacia argyrodendron*) or Coolibah (*Eucalyptus coolabah*) dominated vegetation communities, or pure grassland associated with gilgais.

The most common regional ecosystem in which the species has been recorded is RE 11.4.3, other regional ecosystems where the species has been recorded include: 11.4.6, 11.4.8, 11.4.9, 11.3.3 and 11.5.16. Ornamental snake shelters in logs and under coarse woody debris and ground litter. Sites where ornamental snake have been recorded in abundance share the following habitat characteristics:

- Located within the lowest part of the catchment. Found in greatest numbers in shallow water where some aquatic vegetation is present, or where fringing groundcover vegetation has been inundated, especially in flooded gilgais where the dominant aquatic macrophyte is *Monochoria cyanea*.
- Have a diversity of gilgai size and depth.
- There are soils of high clay content and deep-cracking characteristics. Water retention capacity increases with an increase in the fine clay particle fraction of soils.
- Ground timber is usually relatively common.
- Where burrowing frogs are abundant.
- Habitat patches are typically greater than 10ha in area and are within, or connected, to larger areas of remnant vegetation.

## **Distribution**

The species is known only from the Brigalow Belt North and parts of the Brigalow Belt South biogeographical regions. The core of the species' distribution occurs within the drainage system of the Fitzroy and Dawson rivers. Important populations occur in remnant vegetation on, or surrounding, gilgai mounds and depressions.

## **Survey requirements and survey effort**

Survey guidelines for Australia's threatened reptiles. EPBC Act survey guidelines 6.6

### **EPBC Act survey requirements/techniques**

- No survey methods are known to reliably detect the ornamental snake during dry weather/seasons. The species is most likely to be encountered by searching around suitable gilgai habitat while frogs are active. Driving roads at night, particularly after wet weather when frogs are active, may be necessary if wet weather precludes access to suitable (gilgai) habitat. Diurnal searches under sheltering sites (rocks, logs or other large objects on the ground) could also be employed. Pitfall and funnel trap arrays could be trialled. These methods are all likely to yield low returns.
- It is recommended that all records be photographed and copies lodged with both the state National Parks Service and the Queensland Museum (Brisbane) for confirmation of identification.

### **Project survey effort**

The survey effort for ornamental snake within suitable habitat within the project area in November 2011 included diurnal searches (Detailed: 2 person hours at 1 site on one day, One-off: searches at 5 sites), 2 person hours at 1 site for one night of spotlighting and pitfall trapping at one site for 6 nights. Survey in December 2012 included diurnal searches of 5.4 person hours at 2 sites over 3 days and 1.2 person hours at four sites; spotlighting for 2 person hours at 1 site over 3 days, spotlighting for 1.3 person hours at 1 site over 2 days, and pitfall trapping over 4 nights at 2 sites.

## **Occurrence within the project area**

The ornamental snake was recorded during field surveys and could potentially occur in wetlands and drainage depressions in grass woodlands on alluvium and in natural grasslands.

## **Potential impacts of the proposed action**

The proposed action would result in:

- loss of 1786ha of potential habitat within the project area, consisting of potential foraging, breeding and sheltering habitat
- localised changes in hydrology and water availability
- habitat fragmentation
- habitat degradation from the introduction of feral animals and weeds
- direct mortality from construction activities including animals trapped in trenches and pits.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measures relevant to ornamental snake:

- maintenance of habitat connectivity at the landscape scale (e.g. retention of appropriate habitat within road reserves)
- implementation of appropriate water management, sediment, erosion and pollution controls and monitoring
- implementation of appropriate fire management that accounts for the habitat requirements of ornamental snake
- spotter catcher surveys in suitable ornamental snake habitat prior to clearing
- relocation of logs from cleared areas into retained habitat.

## Residual impact

The proposed action would clear up to 1786ha of potential habitat for ornamental snake of which a proportion is predicted by XCQ to be important habitat (gilgais and mounds). The proposed action is likely to result in a reduction in an important population of ornamental snake within the project area and therefore there is a high risk of a significant impact to the ornamental snake.

## Cumulative impact

XCQ did not assess cumulative impacts on ornamental snake.

## Offsets

1641ha of potential ornamental snake habitat occurs within XCQ's preferred offset property; Meteor Downs. A desktop assessment of offset availability within a 200km radius of the project area identified the potential availability of 272,887ha of ornamental snake habitat offset area.

## Consideration of Plans/Agreements/Conservation Advice

### Conservation Advice

Commonwealth Conservation Advice for *Denisonia maculata* (ornamental snake) approved by the Minister on 29 April 2014.

The approved conservation advice identifies the main threat to the ornamental snake as the continued legacy of past broadscale land clearing and habitat degradation. Another threat is the destruction of wetland habitat by feral pigs, along with associated destruction of frog habitat and direct competition for their food source (frogs). The ornamental snake is potentially threatened by poisoning from the ingestion of cane toads.

Priority actions identified by the recovery plan that relate to the project area include:

### Habitat loss, disturbance and modification

- Identify populations of high conservation priority.
- Investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure if possible.
- Minimise adverse impacts from land use at known sites.

### Animal impacts

- Control introduced pests such as pigs to manage threats at known sites.
- Develop and implement a management plan for the control of cane toads in the region.

### Conservation information

- Raise awareness of ornamental snake and other reptiles found in the Brigalow Belt bioregion within the local community.

### Recovery Plan

No recovery plan has been prepared for the ornamental snake.

## Threat Abatement Plans

The following threat abatement plans are relevant to the ornamental snake:

- Threat Abatement Plan for Predation, Habitat Degradation, Competition and Disease Transmission by Feral Pigs.
- Threat Abatement Plan for predation by feral cats.
- Threat Abatement Plan for Predation by the European Red Fox.

These threat abatement plans focus on the risk to species from feral and pest species. They set out a national framework to guide and coordinate Australia's response to the impacts of cats and foxes on biodiversity to protect affected species and prevent further species being affected.

The broad goals of the Threat Abatement Plan for Feral Pigs is to protect nationally listed threatened species and communities from predation, habitat degradation, competition and disease transmission by feral pigs. The objectives of the Plan are to:

- prevent feral pigs from establishing in areas where they do not currently occur or are in low eradicable numbers, and where they would impact on nationally listed threatened species and ecological communities
- integrate feral pig management plans and their implementation into natural resource planning and investment at the regional, state and territory and federal level through consultation and liaison with key stakeholders
- increase awareness and understanding of land managers and the general community about the damage that feral pigs cause and management options
- quantify the impacts that feral pigs have on biodiversity (especially nationally listed threatened species and ecological communities) and determine the relationship between feral pig density and the level of damage
- improve the effectiveness, efficiency and humaneness of techniques and strategies for managing the environmental damage due to feral pigs.

The objectives of the Threat Abatement Plan for predation by feral cats are to prevent feral cats occupying new areas, promote the maintenance and recovery of species affected by feral cats, improve knowledge and understanding, improve effectiveness of control operations and increase awareness.

The objectives of the Threat Abatement Plan for predation by the European Red Fox are to prevent red foxes occupying new areas, promote the maintenance and recovery of native species and communities that are affected, improve knowledge and understanding of red fox impacts and interactions with species and ecological processes, improve effectiveness of control options and increase awareness.

The priority management actions identified in the approved conservation advice, and the threat abatement plans, have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

XCQ proposed a number of measures to reduce the impact to the ornamental snake. XCQ must offset residual significant impacts to the species in accordance with the EPBC Act Offsets Policy.

EHP is of the view that the proposed action would not have an unacceptable impact on the ornamental snake.

---

## South-eastern long-eared bat (*Nyctophilus corbeni*)

### EPBC Act Status: vulnerable

### Description

The south-eastern long-eared bat is larger in size than other long-eared bats and has a broader skull and jaw. It has a head and body length of about 50-70mm and a tail length of 35-50mm. Weight varies between gender with females (14-21g) heavier than males (11-15g). Little is known about the ecology of this species and most of what is known comes from research outside of Queensland. Roosting has been recorded in hollows of live trees, cracks in tree limbs, occasionally under exfoliating bark and even within foliage. With broad, short wings, the south-eastern long-eared bat is highly manoeuvrable and well-adapted to its cluttered habitat. They fly close to vegetation, often through the canopy and can drop suddenly to almost ground level after prey. Individuals are known to fly more than seven km moving between roosts and foraging areas. Roosts may be changed frequently, with an average of

1.3 days in one study. Mating occurs in autumn and winter. Females are able to store spermatozoa until ovulation and conception in early spring. Two young are usually born in late October to November and lactation continues until January.

The south-eastern long-eared bat (*Nyctophilus corbeni*) is most common in box/ironbark/cypress pine woodland on sandy soils, though it also occurs in bulloak (*Allocasuarina luehmannii*), brigalow (*Acacia harpophylla*) and belah (*Casuarina cristata*) communities, dry sclerophyll forests with *Corymbia citriodora*, and semi-evergreen vine thickets. The species prefers areas with a distinct canopy and a dense understorey. Most records are from large tracts of vegetation (> 5000ha), although the species can be recorded from smaller tracts of 600ha.

## Distribution

The species is largely restricted to the Murray-Darling Basin, with its stronghold in the Pilliga forests of central New South Wales. In Queensland, the species is mainly recorded in Brigalow Belt South, with records from less than 30 locations, extending eastwards to the Bunya Mountains National Park. The distributional limits in Queensland are uncertain. The species is found north to near Duaringa and the Dawson River area may be its northern range limit. However, the most northerly record of the species is from 80km west of Taroom. Forearm length is used extensively in field identifications of *Nyctophilus* species and there is broad overlap between each species for each sex of *N. corbeni* and *N. gouldi*. Larger individuals of *N. gouldi* are the same general size as *N. corbeni*. It is unknown if possible misidentifications of the species have resulted in the uncertainty attached to its distribution.

## Survey requirements and survey effort

Survey Guidelines for Australia's Threatened Bats. EPBC Act survey guidelines 6.1

### EPBC Act survey requirements/techniques

The eastern greater long-eared bat should be surveyed using capture techniques.

- Prior to the survey - In agricultural or other heavily modified landscapes, digital aerial photography of the study area can be examined to determine the size and pattern of vegetation remnants so that trapping effort can be planned.
- Passive acoustic detection - Bat detectors can be used to identify areas used by long-eared bats, even if they cannot be identified to species level. Acoustic detection can then be followed up with an appropriate level of trapping.
- Trapping - Mist nets and harp traps should be placed in woodland, mallee and forest, given that the species forages below the tree canopy, often to ground level. Equipment should be placed both in open fly-ways and within cluttered vegetation. If open water bodies (earth dams, fire dams, open top tanks and watercourses) occur in or near the project area, then significant effort should be given to mist-netting or harp trapping over the water. For project sites where there is no surface water, mist nets can be set over temporary water pools specifically constructed for the purpose of the survey.

### Survey effort guide

Both harp traps and mist nets are effective for this species, and either can be used although harp traps have been employed successfully on a large scale in the past. For large project areas with landscape complexity, traps and nets should be distributed so as to give good representation in the major habitat types.

In the past, *N. timoriensis* has been captured in harp traps at 33% of sites at a rate less than one capture per 20 trap nights. The species is uncommon in some areas but quite common in others. The recommended effort below might provide a reasonable opportunity to make a capture in the Brigalow Belt South and Nandewar Bioregions and possibly in South Australia, but elsewhere it would likely remain undetected. For this species, it is important to consider that failure to capture will not necessarily mean that a significant population of this species does not occur in the area.

EPBC survey guidelines for the *N. corbeni* recommend the use of harp trap or mist nest for a minimum of five night period and a total effort of 20 nights.

## Occurrence within project area

Calls from microbats of the *Nyctophilus* genus were detected on site during the field surveys, however the species cannot be identified without capture and therefore the presence of the species within the project area was not confirmed. An estimated 2891ha of potential *Nyctophilus corbeni* habitat is located within the project impact area in the form of grassy woodland on alluvium, open woodland on igneous or sedimentary and riparian woodlands.

## Potential impacts of proposed action

The proposed action would result in:

- removal of 2891ha of potential south-eastern long-eared bat habitat
- predation by feral animals
- direct mortality during construction via the removal of roosting trees.

## Avoidance and mitigation measures

XCQ proposed to avoid clearing of south-eastern long-eared bat habitat during spring-summer when maternity colonies are likely to form.

## Residual impact

The project would result in the loss of 2891ha of potential south-eastern long-eared bat habitat. XCQ proposed that if a population of south-eastern long-eared bat does occur within the project area, it would not constitute an important population because the habitat preference of the species in the form of dense cluttered understorey woodlands only occurs as discrete patches in more extensive woodlands with an open understorey. This suggests that the project area provides habitat of reduced quality for south-eastern long-eared bats and the project location is not near the limit of the species range.

## Cumulative impacts

The proposed action and the proposed adjacent Meteor Downs South project would result in loss of 3159ha of south-eastern long-eared bat habitat. The provision of offsets would partially compensate for this loss of habitat and would likely reduce but not prevent the long-term decline of south-eastern long-eared bat habitat in the region. However, XCQ did not propose to offset impacts to south-eastern long-eared bat habitat.

## Offsets

XCQ did not propose to offset the impacts to south-eastern long-eared bat habitat.

## Consideration of Plans/Agreements/Conservation Advice

### Conservation Advice

There is no approved conservation advice for the south-eastern long-eared bat.

### Recovery Plan

No recovery plan has been prepared for the south-eastern long-eared bat.

### Threat Abatement Plans

There are no threat abatement plans relevant for the south-eastern long-eared bat.

The priority management actions identified in the approved conservation advice have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## Conclusion

DOE and EHP consider that the project is likely to result in a significant impact to the roosting and breeding habitat for the south-eastern long-eared bat and therefore these impacts would require an offset provision.

---

## Yakka skink (*Egernia rugosa*)

### EPBC Act listing status: vulnerable

### Description

The yakka skink is a pale fawn reptile growing to 40cm. It has a broad dark brown stripe from nape to tail bordered on either side by a narrow, pale fawn back/side stripe. Dark brown to reddish-brown scales on the flanks form a faintly variegated orange-brown pattern. The throat is cream-yellow in colour, with blackish flecks/spots, and the

chest and abdomen are yellow-orange. This skink is often described as robust and around the same size as Blue Tongue lizard making it one of the largest skinks in sub-humid to semi-arid eastern Queensland.

## **Distribution**

The known distribution of the yakka skink extends from the coast to the hinterland of sub-humid to semi-arid eastern Queensland. This vast area covers portions of the Brigalow Belt, Mulga lands, south-east Queensland, Einasleigh Uplands, Wet tropics and Cape York Peninsula bioregions. The yakka skink's distribution is highly fragmented as a large proportion of potential habitat for the species has been cleared throughout the species range. The yakka skink is known to occur in open dry sclerophyll forest, woodland and scrub. The yakka skink is commonly found in cavities under and between partly buried rocks, logs or tree stumps, root cavities and abandoned animal burrows. The species often takes refuge in large hollow logs and has been known to excavate deep burrow systems, sometimes under dense ground vegetation.

## **Survey requirements and survey effort**

Survey Guidelines for Australia's Threatened Reptiles. EPBC Act survey guidelines 6.1

### **EPBC Act survey requirements/techniques**

#### **Survey methods**

Searching for burrow systems and communal defecation sites is the most reliable method of detection. The species can be confirmed by Elliott trapping around the burrows, by distant observation with binoculars or by shining a torch down the burrows at night. Burrows seem often to be located in situations where excavation of the burrow system to locate the lizard is impractical.

#### **Minimum survey effort**

Sufficient time is required to thoroughly search the area by day and to spotlight by night. The minimum survey effort required includes a minimum of three survey days and nights and at least one replicate survey employing all of the recommended techniques, if the species has not already been detected.

#### **Project survey effort**

Fauna surveys were carried out within the habitat types suitable for yakka skink within the project area in November 2011 and December 2012. The November 2011 survey included 2 detailed site surveys with 1 day of survey per site, consisting of 4 person hours, and 2 one-off sites searches. The December 2012 survey was over 3 sites with 3 days per site, consisting of 8.1 person hours per site.

## **Occurrence within project area**

Yakka skink was not recorded during field surveys but could potentially occur in brigalow open forest or woodland, grassy woodland on alluvium, open woodland on igneous or sedimentary and semi-evergreen vine thicket. An estimated 4898ha of potential yakka skink habitat occurs within the project area.

## **Potential impacts of proposed action**

The proposed action would result in:

- the removal of 1764ha of yakka skink habitat within the project area
- habitat fragmentation
- habitat degradation from the introduction of feral animals and weeds
- direct mortality from construction activities including animals trapped in trenches and pits.

## **Avoidance and mitigation measures**

XCQ proposed the following mitigation and management measures relevant to yakka skink:

- the maintenance of habitat connectivity at a landscape scale by retaining appropriate habitat within road reserves
- implementation of appropriate water management, sediment, erosion, pollution controls and monitoring
- implementation of appropriate fire management taking into account yakka skink requirements
- survey by a spotter catcher prior to clearing suitable habitat
- avoidance of areas with large logs and other complex habitat features were possible



- creation of new habitat for yakka skink in remaining habitat by piling cleared trees.

## **Residual impact**

The proposed action would result in the loss of 1764ha of potential yakka skink habitat. XCQ assessed the residual impact risk as medium due to the large area of potential habitat and uncertainty of the occurrence of the species.

## **Cumulative impacts**

XCQ did not assess cumulative impacts on yakka skink.

## **Offsets**

XCQ did not propose to offset impacts to potential yakka skink habitat.

## **Consideration of Plans/Agreements/Conservation Advice**

### **Conservation Advice**

Commonwealth Conservation Advice for *Egernia rugosa* (Yakka Skink) approved by the Minister on 29 April 2014.

The main threat identified in the conservation advice is a continued legacy of past broadscale land clearing and habitat degradation. Other threats to the yakka skink include inappropriate roadside management, removal of woody debris and rock microhabitat features, ripping of rabbit warrens and predation by feral animals.

The following priority recovery and threat abatement actions have been identified in the conservation advice that could be done to support the recovery of the Yakka skink:

### **Habitat Loss, Disturbance and Modification**

- monitor known populations to identify key threats
- identify populations of high conservation priority
- actively discourage the removal of fallen logs, leaf litter and rocks from known and potential habitat sites
- ensure that road widening and maintenance activities and ripping of rabbit warrens in areas where the Yakka skink occurs do not adversely impact on known populations
- investigate formal conservation arrangements, management agreements and covenants on private land, and for crown and private land investigate inclusion in reserve tenure if possible

### **Animal Predation or Competition**

- develop and implement a management plan for the control of foxes and feral cats in the region

### **Fire**

- develop and implement a suitable fire management strategy for the habitat of the Yakka skink

### **Conservation Information**

- raise awareness of the Yakka skink, and other reptiles, within the local community
- engage with private landholders and land managers responsible for the land on which populations occur and encourage these key stakeholders to contribute to the implementation of conservation management actions.

The priority management actions identified in the approved conservation advice have been considered in undertaking this assessment and making the recommendation that the proposed action be approved.

## **Conclusion**

DOE and EHP consider that impacts to this vulnerable species are unlikely to be significant and therefore unlikely to result in the decline in the species, however DOE and EHP recommend that pre-clearance surveys are carried out by a suitably qualified person and should any yakka skinks be located, this should be immediately reported to both agencies for determination as to whether the it is an important population and or requires an offset provision.

## **Collared delma (*Delma torquata*)**

### **EPBC Act listing status: vulnerable**

#### **Description**

Collared delma is the smallest of the legless lizards. It is brown to reddish-brown in colour, becoming grey to bluish-grey on the tail with a slightly paler belly. It has large black bands across the head and nape interspaced with four cream-yellow stripes. The species has a maximum total length of about 19cm.

#### **Distribution and habitat**

The collared delma is known from the western suburbs of Brisbane and the following sites: Bunya mountains, Blackdown Tableland NP, Bullyard Conservation Park, D'Aguilar Range NP, Expedition NP, Naumgna and Lockyer Forest Reserves, Western Creek near Millmerran and the Toowoomba Range.

The collared delma normally inhabits eucalypt dominated woodland and open forest where it is associated with suitable micro-habitats (exposed rocky outcrops). The ground cover is predominantly native grasses, such as kangaroo grass, barbed wire grass, wiregrass and lomandra.

#### **Survey requirements and survey effort**

##### **EPBC Act survey requirements/techniques**

###### **Survey methods**

###### **Habitat assessment**

A habitat assessment is recommended to be undertaken as a preliminary step to designing and undertaking a targeted survey, including:

- determine the proximity of nearest records to the study area
- search relevant databases such as Zoology Data Search (Queensland Museum) and Wildlife Online (Queensland Department of Environment and Resource Management)
- obtain State vegetation mapping for the study area to determine the extent of suitable habitat including the presence of associated vegetation communities
- determine the presence of suitable microhabitat features in the study area.

###### **Targeted survey**

Targeted surveys to confirm the presence/absence of the collared delma are done by actively searching suitable habitats.

###### **Optimal conditions for active searching**

The species is more likely to be detected when conditions are warm, not too dry and maximum temperatures are greater than 25°C. Optimal survey times for active searching are early morning (within four hours of dawn) and during the evening on warm nights.

###### **Minimum survey effort**

Sufficient time is required to thoroughly search the study area. The minimum survey effort required includes:

- a minimum of three survey days
- at least one replicate survey employing all of the recommended techniques, if the species has not already been detected.

###### **Project survey effort**

Surveys were conducted in November 2011 within suitable collared delma habitat consisting of two sites with 5.4 person hours over 1 day each and 7 one-off sites with an effort of 2.1 person hours.

EHP considers that, having regard to the threatened reptiles survey guideline recommended survey effort, the project survey effort was not sufficient to detect the presence of a collared delma population.

## Occurrence within project area

Collared delma was not recorded during field survey but could potentially occur in grassy woodland on alluvium and within brigalow open forests or woodland. An estimated 745ha of potential collared delma habitat occurs within the project area.

Potential impacts of proposed action

The proposed action would result in:

- the removal of 400ha of potential collared delma habitat within the project area
- habitat fragmentation
- habitat degradation from the introduction of feral animals and weeds
- direct mortality from construction activities including animals trapped in trenches and pits.

## Avoidance and mitigation measures

XCQ proposed the following mitigation and management measures relevant to collared delma:

- the maintenance of habitat connectivity at a landscape scale by retaining appropriate habitat within road reserves
- implementation of appropriate water management, sediment, erosion, pollution controls and monitoring
- implementation of appropriate fire management taking into account collared delma requirements
- survey by spotter catcher prior to clearing suitable habitat
- relocation of logs from cleared areas into retained habitat.

## Residual impact

The proposed action would result in the loss of 400ha of potential collared delma habitat. XCQ assessed that the proposed action would result in a significant impact due to the large impact to the species' habitat at the edge of the species range. The area of collared delma habitat to be cleared would be large, although of medium quality.

## Cumulative impacts

XCQ did not assess cumulative impacts on collared delma.

## Offsets

XCQ did not propose to provide an offset for the impacts to Collared delma habitat.

## Consideration of Plans/Agreements/Conservation Advice

### Conservation Advice

Commonwealth Conservation Advice for *Delma torquata* (collared delma) approved by the Minister on 3 July 2008

The main threats identified in the conservation advice are habitat loss through clearing for agriculture; habitat degradation by overgrazing by stock; removal of rocks, coarse woody debris and ground litter; use of agricultural chemical, predation by feral cats and foxes and weed invasion.

The following priority recovery and threat abatement actions have been identified in the conservation advice that could be done to support the recovery of the collared delma:

### Habitat loss, disturbance and modification

- monitor known populations to identify key threats
- identify sites of high conservation priority
- protect areas of habitat that contain populations/occurrences of the collared delma
- ensure road widening and maintenance activities in areas where the collared delma occurs do not adversely impact on known populations
- investigate formal conservation arrangements, such as covenants or inclusion in reserve tenure

### Fire

- develop and implement a suitable fire management strategy for the collared delma

- provide for a 50 m buffer during prescribed burns in known species habitat
- encourage mosaic burns outside the buffer zone to prevent high intensity wildfire in species habitat
- provide maps of known occurrences to local and state rural fire services and seek inclusion of mitigative measures in bush fire risk management plans, risk register and/or operation maps

#### Conservation information

- raise awareness of the collared delma within the local community, in particular among landowners, developers and landscape suppliers

#### Establishing additional populations

- investigate options for linking, enhancing or establishing additional populations.

#### Conclusion

DOE and EHP consider that impacts to this vulnerable species are unlikely to be significant and therefore unlikely to result in the decline in the species, however DOE and EHP recommend that pre-clearance surveys are carried out by a suitably qualified person and should any collared delma be located, this should be immediately reported to both agencies for determination of the whether it is an important population and/or requires an offset provision.

## Listed migratory species (sections 20 & 20A)

Australia provides critical non-breeding habitat for millions of migratory waterbirds each year. To ensure their conservation, the Australian Government has fostered international cooperation through a range of important agreements, including the Ramsar Convention and the Convention on Migratory Species, bilateral agreements with Japan, China and the Republic of Korea, and through the recently launched East Asian — Australasian Flyway Partnership. A range of important activities have also been undertaken within Australia to conserve migratory waterbird populations and their habitats.

Migratory waterbirds include species such as plovers, sandpipers, stints, curlews and snipe. These birds make round trip migrations of up to 26,000 km each year between their breeding grounds in the northern hemisphere and their non-breeding areas in the south. These trips are made in several weeks, with brief stops at staging sites along the way to rest and refuel for the next leg of their journey.

The corridor through which these waterbirds migrate is known as the East Asian - Australasian Flyway (the Flyway). It extends from within the Arctic Circle, through East and South-east Asia, to Australia and New Zealand. Stretching across 22 countries, it is one of eight major waterbird flyways recognised around the globe.

Wetland habitat loss and degradation is a significant threat to migratory waterbirds, and the conservation of important sites across the Flyway is essential to their survival. Many pressures are contributing to this degradation, of which population growth and economic development in East and South East Asia are of particular concern.

XCQ identified the following migratory species as potentially present within the project area:

- magpie goose (*Anseranas semipalmata*)
- fork-tailed swift (*Apus pacificus*)
- great egret (*Ardea alba*)
- cattle egret (*Ardea ibis*)
- Latham's snipe (*Gallinago hardwickii*)
- white-bellied sea eagle (*Haliaeetus leucogaster*)
- white-throated needletail (*Hirundapus caudacutus*)
- rainbow bee-eater (*Merops ornatus*)
- satin flycatcher (*Myiagra cyanoleuca*)
- rufous fantail (*Rhipidura rufifrons*)
- Australian painted snipe (*Rostratula australis*).

## Survey requirements and survey effort

### EPBC Act survey requirements/techniques

Wetland birds vary in their conspicuousness depending on lifestyle and time of the year. Generally, species that frequent open water will be conspicuous and easily detected throughout the day. Others that inhabit dense vegetation in wetlands and on the margins of water-bodies will often be difficult to sight, and detection will usually rely on call recognition or flushing. In general, calls will be most frequent in the early morning but are also strongly dependent on time of year. Currently, three wetland species are listed as threatened under the EPBC Act.

Broadcast surveys in suitable habitat for solicited call responses and sightings. Broadcast stations may be established at wetland edges to avoid damage to wetland vegetation. Stations should usually be at least 250m apart.

Observations of targeted foraging habitat within wetlands in the early morning or early evening are recommended. Wetland birds are detected by sightings and unsolicited calls.

Area searches in suitable habitat for sightings, nests, indicative footprints and feathers.

### Project survey effort

Bird surveys were conducted using both aural and visual survey to determine the species present within individual regional ecosystems. EPBC Act-listed birds were specifically investigated at habitats which might be utilised by these species (e.g. wetlands and dams).

### Occurrence within project area

Natural aquatic habitat for migratory wetland species in the project area were generally limited to freshwater wetland habitats. Farm dams could provide artificial habitat for species that utilised open water bodies. Other migratory species are likely to frequent the riparian vegetation of watercourses within the project area such as Bootes, Meteor and Sandy creeks.

Field surveys confirmed the presence of the following migratory bird species within the project area:

Field surveys confirmed the presence of the following migratory bird species within the project area:

- magpie goose (*Anseranas semipalmata*)
- great egret (*Ardea alba*)
- cattle egret (*Ardea ibis*)
- white-bellied sea eagle (*Haliaeetus leucogaster*)
- white-throated needletail (*Hirundapus caudacutus*)
- rainbow bee-eater (*Merops ornatus*)
- rufous fantail (*Rhipidura rufifrons*)
- Australian painted snipe (*Rostratula australis*)

### Impacts of the proposed action

Potential impacts on migratory wetland birds associated with the proposed project activities include:

- loss of potential habitat to migratory species
- direct mortality of individuals during construction and operation to Latham's snipe
- destruction of nests during construction of rainbow bee-eater
- habitat degradation due to changes in water quality and flow regimes
- predation by feral animals
- invasion of wetland habitats by exotic species and weeds.

All migratory species would incur habitat loss. The proposed action would result in the loss of:

- 23ha of magpie goose, great egret, cattle egret, Latham's snipe, Australian painted snipe and white-bellied sea eagle habitat
- 158ha of satin flycatcher habitat
- 2941ha of rufous fantail habitat
- 5649ha of fork-tailed swift, white-throated needletail and rainbow bee-eater habitat.

Some migratory species would be indirectly impacted through changes to water quality and changed hydrology. Impacts to the Australian Painted Snipe are discussed above under listed threatened species.

## **Avoidance and mitigation measures**

Mitigation and management measures proposed by XCQ relevant to migratory species included a combination of practices that aim to avoid, minimise, mitigate or compensate impacts on these species. Actions within the current Rolleston Coal Environmental Management plan, Rehabilitation Management Plan, Biodiversity and Land Management Plan and Pest Management Plan (plans proposed to be implemented for the expanded mining operation) potentially relevant to migratory species included:

- minimisation of the disturbance footprint
- retention of access to natural water supplies for dependent migratory species
- avoidance of lighting of riparian and woodland habitat areas
- employment of suitably qualified and experienced environmental staff
- internal regulation of vegetation clearing
- fauna survey and relocation prior to clearing
- collection of native plant seed, rocks and logs prior to clearing for use in rehabilitation
- limitation of vehicle speed to 70km/hour in the project area
- weed and exotic plant control strategies
  - physical and chemical treatment methods
  - selective topsoil stripping and stockpiling
  - vehicle washdown
- pest animal control strategies
  - limiting artificial food sources
  - participation in syndicated control within regional control programs
- progressive rehabilitation with native species of areas larger than 5ha within 18 months of mining completion
- rehabilitation of 100m riparian corridor at Bootes creek
- provision of fauna habitat with rocks and logs in rehabilitated landscapes
- revegetation trials to achieve a self-sustaining semi-evergreen vine thicket community.

## **Residual impact**

The proposed action would result in the loss of:

- 23ha of magpie goose, great egret, cattle egret, Latham's snipe, Australian painted snipe and white-bellied sea eagle habitat
- 158ha of satin flycatcher habitat
- 2941ha of rufous fantail habitat
- 5649ha of fork-tailed swift, white-throated needletail and rainbow bee-eater habitat.

XCQ considered that there was no important habitat for migratory species within the project area and considered that most species are at a low risk of a significant impact due to the species extensive distribution and high availability of habitat outside the project area. Within the project area, most of the wetlands would be retained and some additional wetlands created as additional impoundments for mine water. Two species, the rainbow bee-eater and magpie goose have breeding habitat within the project area. The loss of breeding habitat is considered by XCQ not to be significant to either species.

## **Cumulative impacts**

XCQ did not assess cumulative impacts on migratory species.

## **Offsets**

XCQ did not propose to provide an offset for the impacts to migratory species habitat.

## Conclusion

DOE and EHP consider that the proposed action is unlikely to result in significant impacts on migratory species.

---

## Water resources (sections 24D and 24E)

On 17 October 2013, the Minister for the Environment notified XCQ that he had determined that a water resource, in relation to coal seam gas development and large coal mining development was an additional controlling provision for the project. Because of this controlling provision, the assessment of the project's impacts on water resources is a relevant component of this assessment report.

The EIS stated it adopted assessment methodologies consistent with the Commonwealth's Guidelines for Proposals Relating to the Development of Coal Seam Gas and Large Coal Mines where there is a Significant Impact on Water Resources and Draft significant impact guidelines: Coal seam gas and large coal mining developments — impacts on water. Consideration of groundwater dependent ecosystems (GDEs) was provided in sections 21.7, 21.8 and 21.9 and Chapter 13, Terrestrial flora and Chapter 15, Aquatic ecology.

A detailed review of the EIS assessment of potential impacts of the project on surface and ground water is provided in sections 4.12 and 4.13 of this EIS assessment report. The exhibited EIS was reviewed by the IESC, who provided advice to EHP and DOE.

### Groundwater

The EIS relied on groundwater modelling to support the assessment of potential impacts. In particular, the EIS presented modelling contours for groundwater depressurisation based on assumption of the equivalent behaviour of alluvial and basalt aquifers.

XCQ subsequently clarified that in reality the alluvial and basalt aquifer systems are not connected and will behave independently. A massive, non-fractured basalt layer confined the deeper aquifer in fractured basalt at depths of generally over 20m below ground level. Moreover, available borehole data confirmed that rock and regolith above the massive basalt layer were unsaturated. In contrast, the alluvial aquifer is unconfined and follows into the riparian zone and floodplains of Meteor and Sandy Creeks, and to a lesser extent Bootes Creek. The EIS concluded that the drawdown of groundwater levels due to dewatering of the project's mine pits would increase from that attributable to the existing mine. Modelling in the EIS indicated that groundwater levels within the saturated alluvial aquifer would decrease through drainage of groundwater through connected alluvial areas to the mining pits. The EIS noted that this potential loss of shallow alluvial groundwater would be permanent and limited to alluvium directly connected to the pits and its general occurrence was limited to the Meteor Creek alluvium. The extent of this loss from the alluvial aquifer was limited upstream by the sandstone barrier of the Consuela anticline and downstream by a basalt barrier within Albinia National Park. Some recovery of the alluvial aquifer is expected following mining, although a net permanent movement towards the residual mine pits is expected.

Depressurisation and drawdown in the deeper basalt aquifer may reduce groundwater levels in a number of landholder bores, noting that most affected bores are on land now owned by XCQ. The net groundwater inflow to residual mine voids is expected to be permanent due to the losses from evaporation of the exposed pit waters. The EIS predicts that groundwater drawdown in the basalt aquifer would reach 'quasi-equilibrium' after about 200 years, progressively extending further laterally and potentially affecting more bores.

The IESC was generally satisfied with the groundwater modelling but expressed some reservations about the parameter setting for the alluvial aquifer. It had more substantive concerns about the limited assessment of the potential ecological impacts of groundwater drawdown.

According to the EIS, there are no wetlands adjoining the project area that are fed by aquifers that would be vulnerable to depressurisation, since wetlands within the depressurisation zone are fed by either surface flows or perched aquifers.

As noted in section 5.8.5 above (and section 4.13), some changes were made to the EIS to clarify the potential impacts on GDEs as a result of groundwater depressurisation, which responds to the IESC's concerns. Additional information provided by XCQ has clarified that GDEs above the basalt aquifer are unlikely to be affected by any depressurisation within it. This information has also clarified that the total estimate of GDEs above the alluvial aquifer and located outside the project footprint – i.e. to the north and east - that could be affected by groundwater depressurisation is 121ha. A small part (approximately 2.5ha) of this potentially affected GDE area is within Albinia National Park.

It is concluded that further assessment and monitoring will be required to clarify the ecological values at risk, evaluate the impact of the expansion project and guide appropriate management responses.

## Surface water

While the IESC had some reservations, EHP is satisfied that the EIS provided generally robust hydrological and hydraulic modelling of surface flows, using a combination of one-dimensional modelling for Bootes Creek and two-dimensional modelling for Sandy and Meteor Creeks. Potential impacts on flood behaviour along the latter waterways were well characterised.

Within the middle reach of Meteor Creek affected by pit dewatering, the EIS predicted that there would be a total permanent loss of stream baseflow from groundwater. Further, the EIS modelling predicted that the average number of no-flow days in Meteor Creek would increase by 57 from 74 days to 131 days per year. The EIS stated that other watercourses are not expected to lose baseflow from groundwater as they are not directly connected through the alluvium to the mine pits and final voids.

The EIS concluded that this impact of loss of baseflow in Meteor Creek would not have significant ecological consequences, in light of the typical dynamics of ephemeral streams in the region, involving ecological regeneration in response to high flow events. Patterns of high flow events are not expected to be affected by the project. The EIS concluded that sufficient surface flows would be maintained to support the ecology of the streams.

The EIS provided a limited assessment of existing water quality conditions and the potential impacts of mine-affected discharges on the ecological and other environmental values of surface waters. The EIS stated that the current discharge limits for the RCM have not adversely affected environmental values in the relevant watercourses and hence are suitable to be applied to the project.

To confirm this further assessment and monitoring of water quality and ecological values along the affected waterways will be required to clarify the values at risk and guide appropriate management responses.

## Impacts to aquatic ecology

Consistent with the summary of the assessments of potential ecological impacts arising from changes to groundwater and surface waters, the EIS concluded that the likelihood of adverse impact to aquatic ecosystems from the predicted losses of baseflow in Meteor Creek is low due to:

- the reliance of the ecosystems in this ephemeral stream on high flow events to drive their regeneration
- sufficient surface flows being maintained to maintain the base ecological functioning of the streams.

XCQ proposes to extend and apply the water management plan that has been developed for the Rolleston Coal Mine to manage both clean and mine-affected water on the Rolleston Coal Expansion project site. Clean water is to be diverted around the mine site via drainage realignments and two major creek diversions. Mine affected water, including runoff from disturbed areas and groundwater seepage into the pits, is to be captured in dams. It is only to be released to waters in accordance with performance requirements for the quality and flow rates of discharges relative to that in the receiving waters, as specified in the environmental authority issued under the *Environmental Protection Act 1994*.

XCQ proposes to enter into make good agreements with landholders whose bores are affected by groundwater depressurisation.

## Conclusions

EHP is satisfied that potential impacts on water resources have been adequately assessed. However further assessment and monitoring would be required to clarify the ecological values at risk (including GDEs), evaluate the impact of the expansion project and guide appropriate management responses with respect to groundwater.

Similarly, surface water impacts require further assessment and monitoring of water quality and ecological values along the affected waterways to clarify the values at risk and guide appropriate management responses.

The EIS concluded that reduced baseflows present an insignificant risk to the maintenance of the health of affected tree species. Notwithstanding the concerns of the IESC, having regard to relevant regional studies of ephemeral ecosystems, the claim in the EIS that the predicted increase in no-flow days in the lower reach of Meteor Creek including Albinia National Park would not significantly impact on either aquatic ecology or riparian GDEs is accepted here.

While the EIS stated that discharges of mine-affected water from the RCM to date have not adversely affected the ecology of downstream watercourses, it is considered that the EIS investigations were insufficient to support a conclusion that potential changes to both water quality and flows in Meteor Creek as a result of the project would not have adverse downstream impacts. Only if the receiving water quality is similar to that being discharged could there be confidence that the HEV values within Albinia National Park would not be compromised.



# Appendix C      Transport, main roads and maritime safety requirements

## Post-Assessment Contact with the Department of Transport and Main Roads

Once XCQ has received final approval to proceed with the project, the XCQ shall contact the Manager of the DTMR Rockhampton Regional Office, no later than nine (9) months prior to the commencement of any project construction works to discuss the preparation of the finalised road impact assessment (RIA), road-use management plan (RMP) and traffic management plan (TMP).

## Transport Infrastructure

1. XCQ must implement all impact mitigation measures necessary to avoid adverse impacts on the safety, condition and efficiency of state-controlled and local roads for all stages of the project
2. An impact mitigation program must be determined at least three (3) months prior to the commencement of project construction and may be one or more of the following:
  - a. Construction of any required works (including site accesses) as and when stated in an approved Road Impact Assessment (RIA) report
  - b. Payment of any contributions towards the cost of works, rehabilitation or maintenance as and when stated in a RIA
  - c. Undertake or implement any other action as and when stated in an approved road-use management plan (RMP) and traffic management plan (TMP)
  - d. Actions or payments as otherwise agreed in writing with DTMR and/or the relevant LGA(s)<sup>2</sup> for example, in an infrastructure agreement.

## Road impact assessments

An acceptable RIA report is one developed by a suitably qualified person in accordance with the TMR Guidelines for Assessment of Road impacts of Development (2006) (GARID)<sup>3</sup> and includes:

- a. a completed DTMR 'Transport Generation *proforma*'<sup>4</sup> detailing project-related traffic and transport generation information
- b. use of DTMR's Pavement Impact Assessment tools<sup>5</sup> or such other method or tools as agreed in writing with DTMR and the relevant LGA(s)
- c. a clear indication of where detailed estimates of project-related traffic are not available, and documentation of the assumptions and methodologies that have been previously agreed in writing with DTMR and relevant LGA(s), prior to RIA finalisation
- d. details of the final impact mitigation proposals, listing infrastructure-based mitigation strategies, including contributions to road works, rehabilitation, maintenance and summarising key road-use management strategies.

The RIA should also provide ALCAM assessments of all rail crossings. Development Impact is to be projected at 5 year increments for the first 10 years of construction and operation of the project with future reviews and assessments to occur every 5 years thereafter including decommissioning.

The RIA should be submitted to TMR and/or the relevant LGA(s) for review six (6) months prior to the anticipated commencement of the project, or the relevant project stage.

## Road-use management plans

An acceptable road-use management plan (RMP) is one developed by a suitably qualified person in accordance with DTMR's Guide to Preparing a Road-use Management Plan for each stage of the project and includes:

- a. a table listing RMP commitments and provides confirmation that all works and road-use

---

<sup>2</sup> For example, mitigation measures or actions related to operational traffic (routes, hours of operation and the like) that would not need to be implemented during the construction phase

<sup>3</sup> Available at <http://www.TMR.qld.gov.au/business-industry/Technical-standards-publications.aspx>

<sup>4</sup> Available from DTMR Transport System Management Branch, Brisbane

<sup>5</sup> Available from DTMR Regional Offices

management measures have been designed and/or will be undertaken in accordance with all relevant TMR standards, manuals and practices

- b. optimised project logistics and minimised road-based trips on all state-controlled and local roads.

The RMP (and associated TMP(s)) should be submitted to TMR and/or the relevant LGA(s) for review six (6) months prior to the anticipated commencement of the project, or the relevant project stage.

### **Permits, approvals and traffic management plans**

To ensure efficient processing of the project's required transport-related permits and approvals, XCQ should, no later than three (3) months, or such other period agreed in writing with DTMR and the relevant LGA(s), prior to the commencement of significant construction works or project-related traffic:

- a. submit detailed drawings of any works required to mitigate the impacts of project-related traffic to TMR and the relevant LGA(s) for review and approval
- b. obtain all relevant licenses and permits required under the *Transport Infrastructure Act 1994* for works within the state-controlled road corridor (section 33 for road works approval, section 62 for approval of location of vehicular accesses to state roads and section 50 for any structures or activities to be located or carried out in a state-controlled road corridor)
- c. obtain permits for any excess mass or over-dimensional loads for all phases of the project in consultation with TMR's Heavy Vehicles Road Operation Program Office, and the relevant LGA(s), as required by the *Transport Operations (Road Use Management) Act 1995*
- d. prepare Traffic Management Plan(s) (TMP(s)) in accordance with DTMR's Guide to Preparing a Traffic Management Plan<sup>6</sup>. A TMP must be prepared and implemented during the construction and commissioning of each site where road works are to be undertaken, including site access points, road intersections or other works undertaken in the state-controlled road corridor.

### **Maritime infrastructure**

3. XCQ must implement all impact mitigation measures necessary to avoid adverse impacts on the safety, condition and efficiency of shipping in Queensland waters from project shipping. Further discussion with the relevant Regional Harbour Masters is required to determine any required measures and an aids to navigation plan developed and approved if deemed necessary. A maritime infrastructure agreement may also be required and need approval from the relevant Regional Harbour Master and Maritime Safety Queensland in conjunction with this. Any plans and agreements must be in place and approved prior to construction.

### **Maritime safety, traffic and ship-sourced pollution impact assessments**

Further discussions with the relevant Regional Harbour Master are required about maritime safety, traffic and ship-sourced pollution impacts from the project. The following plans must be developed by suitably qualified people to be approved by the relevant Regional Harbour Masters if deemed necessary:

- vessel traffic management
- ship-sourced pollution prevention.

Any plans and agreements must be in place and approved before the project begins construction.

### **Maritime Safety-related conditions**

XCQ should identify and address any increased impacts and risks on maritime safety and marine pollution related to the increased transport of product exports via Queensland waters.

Further information would also be required on the cumulative impacts of the project from a marine transport perspective including any impacts from the transportation of material to construct the facility and any infrastructure required for product export, and during its operation. To assist XCQ identify maritime-related impacts and to define mitigation strategies, Maritime Safety Queensland has developed guidelines for major development proposals. The guidelines specify the minimum information required by Maritime Safety Queensland to evaluate significant development proposals. The preferred format for presentation of this information is through the development of management plans for:

- vessel traffic management

---

<sup>6</sup> Available from TMR Regional Offices or Transport System Management Branch, Brisbane

- aids to navigation
- ship-sourced pollution prevention.

The guideline is available at <http://www.msq.qld.gov.au/Waterways/Major-development-proposals.aspx>.

Maritime Safety Queensland, as a branch within the Department of Transport and Main Roads, is the concurrence authority for maritime matters as they relate to safety of navigation and prevention of ship-sourced pollution.

Maritime Safety Queensland has statutory responsibilities under the following legislation and it is a requirement that XCQ's proposal complies with these regulatory requirements:

- *Maritime Safety Queensland Act 2002*
- Maritime Safety Queensland Regulation 2002
- *Transport Operations (Marine Safety) Act 1994*
- Transport Operations (Marine Safety) Regulation 2004
- *Transport Operations (Marine Pollution) Act 1995*
- Transport Operations (Marine Pollution) Regulation 2008.