Central Queensland Coal Project

Chapter 3 - Project Changes and Responses to Regulator Comments

Central Queensland Coal

CQC SEIS, Version 3

October 2020

Contents

Figures

Tables

Terms and Abbreviations

µS/cm	Micro siemens per centimetre
AEP	Annual Exceedance Probability
AgTEM	Agricultural Transient Electromagnetic System
AHD	Australian Height Datum
Al	Aluminium
ANZECC	Australian and New Zealand Environment and Conservation Council
ANZG	Australian and New Zealand Guidelines for Fresh and Marine Water Quality
AQMP	Air Quality Management Plan
ARMCANZ	Agriculture and Resource Management Council of Australia and New Zealand
As	Arsenic
ASS	Acid sulfate soils
AASS	Actual Acid sulfate soils
ASSMP	Acid sulfate soils Management Plan
BfMP	Bushfire Management Plan
BIMP	Biting Insect Management Plan
BMP	Blast Management and Monitoring Plan
BOS	Biodiversity Offset Strategy
BTEXN	benzene, toluene, ethylbenzene, xylene, naphthalene
CDMP	Coal Dust Management Plan
CHMP	Cultural Heritage Management Plan
CHPP	Coal Handling and Preparation Plant
CMP	Construction Management Plan
CPESC	Certified Professional in Erosion and Sediment Control
CQC	Central Queensland Coal Pty Ltd
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
dB(A)	The A-weighted sound pressure level
dB (Linear)	The Z-weighted (linear) sound pressure level
DEHP	Department of Environment and Heritage Protection
DES	Department of Environment and Science
DiDo	Drive-in Drive-Out

DNRME	Department of Natural Resources, Mines and Energy
DTMR	Department of Transport and Main Roads
EA	Environmental Authority
EC	Electrical conductivity
EIS	Environmental Impact Statement
ELA	Eco Logical Australia
EMP	Environmental Management Plan
EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ESC	Erosion and Sediment Control
ESCP	Erosion and Sediment Control Plan
FHA	Fish Habitat Area
GBR	Great Barrier Reef
GBRMP	Great Barrier Reef Marine Park
GBRWHA	Great Barrier Reef World Heritage Area
GDEs	Groundwater Dependent Ecosystems
GDEMMP	Groundwater Dependent Ecosystem Management and Monitoring Plan
GHGMP	Greenhouse Gas Management Plan
GMMP	Groundwater Management and Monitoring Plan
ha	Hectares
HMMP	Hazardous Materials Management Plan
IESC	Independent Expert Scientific Committee
Kh/Kv	Permeability Anisotropy Ratio
kL/day	Kilolitres per day
km	Kilometres
$L_{Aeq, adj,15 min}$	The A-weighted, equivalent continuous sound pressure level for any 15 minutes sample period
$L_{A01, adj,15 min}$	The A-weighted, equivalent continuous sound pressure level that is equal to or exceeded for 1% of any 15 minutes sample period
LFC	Landscape Fragmentation and Connectivity
L/s	Litres per second
LSAT	Land Suitability Assessment Techniques
LUMP	Land Use Management Plan

m	Metres
m^2	Square Metres
MAW	Mine Affected Water
Mbcm	Million bank cubic metres
mbgl	Metres Below Ground Leve
m/d	Metres per day
MIA	Mine Infrastructure Area
ML	Mining Lease Application
ML	Mega Litres
mm	Millimetres
MMC	Marine Mammal Commission
MNES	Matters of National Environmental Significance
Mo	Molybdenum
MOLR	Method of Last Resort
MSES	Matters of State Environmental Significance
MWMP	Mineral Waste Management Plan
NHVR	National Heavy Vehicle Regulator
NVMP	Noise and Vibration Management Plan
OAMP	Offset Area Management Plan
OCG	Office of Co-ordinator General
OMP	Offset Management Plan
OUV	Outstanding Universal Value
PASS	Potential Acid Sulphate Soils
PIA	Pavement Impact Assessment
PRCP	Progressive Rehabilitation and Closure Plan
Qa	Quaternary Alluvium
QEOP	Queensland Environmental Offsets Policy
Qpa	Quaternary Pleistocene Alluvium
QWQG	Queensland Water Quality Guidelines
RE	Regional Ecosystem
REMP	Receiving Environment Monitoring Program

RIA	Road Impact Assessment
RL	Reduced Level
RPEQ	Registered Professional Engineer Queensland
SCR	State Controlled Road
SDAP	State Development Assessment Provisions
Se	Selenium
SEIS	Supplementary Environmental Impact Statement
SIA	Social Impact Assessment
SRMS	Scaled Root Mean Square
SSMP	Significant Species Management Plan
SWMP	Surface Water Management Plan
t	Tonnes
TARP	Trigger Action Response Plan
TIA	Traffic Impact Assessment
TLF	Train Loadout Facility
TMR	Previously DTMR
ToR	Terms of Reference
TPH	Total petroleum hydrocarbons
TRH	Total recoverable hydrocarbons
TVM	Time-varying Material
V	Vanadium
WMP	Mine Site Water Management Plan
WPMP	Weed and Pest Management Plan
WQO	Water Quality Objectives
WRM	WRM Water and Environment
WSTMP	Waste Management Plan

3 Project Changes and Responses to Regulator Comments

3.1 Purpose of this Chapter

On 20 December 2018 Central Queensland Coal Pty Ltd (CQC) lodged a second amended version of the Styx Coal Project Supplementary Environmental Impact Statement (referred to herein as SEIS v2) with the Queensland Department of Environment and Science (DES). On 14 June 2019, via DES, CQC received submissions from five Queensland Government agencies, and the Commonwealth Department of Environment and Energy. Many of the comments from the agencies concluded that version two of the SEIS did not adequately address their original submissions and/or the Terms of Reference (ToR) of the Environmental Impact Statement (EIS), and that further assessment was required to be undertaken by 18 June, 2020.

As a result, on June 14, 2019, DES wrote to CQC to inform them that, in order for the EIS to proceed under section 56A(2) (with section 56A(4)) of the EP Act, they were providing CQC with an opportunity to:

a. amend the statement of response to the submissions which were provided under section 56(2)(b) and
b. make additional amendments to the submitted amended EIS provided under section 56(2)(d) (along with an amendment notice under section 66 of the EP Act).

Accordingly, this SEIS (SEIS Version 3 or SEIS v3) has been prepared to address the comments arising from the adequacy review of the SEIS v2. Substantial work has been undertaken to provide comprehensive assessment and responses to these comments.

This chapter describes the Project changes that have arisen, and the additional work undertaken, to address the agency comments regarding the SEIS v2. The chapter contains the following information:

- a description of the work undertaken to support this SEIS (v3)
- the major project changes that have occurred as a result of addressing the SEIS v2 comments
- a description of the major changes to the SEIS document (compared to the SEIS v2 version)
- a summary of the submissions received on the SEIS v2 and
- each of the comments received from agencies regarding SEIS v2 and corresponding responses from the proponent.

The comments and associated responses associated with the EIS and the two earlier, 2018, versions of the SEIS are provided in Appendix 13.

3.2 Additional Work Commissioned to Inform SEIS v3

The revised impact assessment for this SEIS v3 was supported by extensive technical studies, including revised acoustic and air quality modelling, hydrological (surface water) modelling, a regional groundwater model, field studies on groundwater dependent ecosystems (GDEs), the geological properties of the alluvium of Tooloombah and Deep creeks, a sediment budget for the site and upstream catchment, a fluvial geomorphology study, a surface water-groundwater interactions study and several ecological investigations. In addition, ongoing monitoring of surface water and groundwater quality has enabled the supplementation of existing baseline information, to further

support analyses associated with the impact assessment, and the continuation of baseline monitoring programs.

This work supplemented the extensive baseline investigations completed since 2011 as part of the EIS studies. A summary of each new study and where it is contained within the SEIS is given in Table 3-1, below. Note that a number of studies from the former SEIS were also used to inform this version. They have been included as Appendices to this SEIS. The full list of Appendices used to inform this SEIS is given in Table 3-3.

Table 3-1: New studies commissioned for SEIS v3

Title and Appendix	Description
Appendix 3a – Land Suitability Assessment (HESSE 2020)	The soil investigation results presented in the SEIS v2 were incorporated with previous land and soil investigation results from 2012 (that were not included in SEIS v2) into a stand-alone soil and land suitability assessment. This replaces the former Appendix 3 which included only the later soil results (now incorporated in the report).
Appendix 3b - Geochemical Assessment (RGS 2020a)	A stand-alone geochemical assessment report detailing earlier work undertaken by RGS on the Project in 2012 and incorporating additional sampling and test work conducted since that time.
Appendix 3c - Land Stability Assessment (RGS 2020b)	Commissioned to provide an assessment and recommendations to ensure the stability of the waste rock and post-mine rehabilitated landforms.
Appendix 5a – Surface Water Quality Technical Report (Orange Environmental 2020a)	A stand-alone report combining all of the available surface water quality data, and providing an analysis of data quality and summary of the data.
Appendix 5b – Flood Study and Site Water Balance (WRM 2020a)	Technical assessments of surface waters, including a flood assessment; a water balance; modelling the effects of the Project on natural streamflows, wetlands and pools; and the effects of releases on downstream water quality. Predictions on changes to the existing hydrological regime in response to the Project were used inform an assessment of impacts on GDEs, aquatic ecology values, marine ecology values and the Great Barrier Reef (GBR).
Appendix 5c – Draft Mine Site Water Management Plan (WRM 2020b)	A draft Water Management Plan for the Project.
Appendix 5d – Fluvial Geomorphology report (Gippel 2020)	Study describing the existing geomorphological values and processes of the Study Area, with discussion of likely impacts including from erosion. This information was relevant to the assessment of impacts on GDEs, aquatic ecology values, marine ecology values and the GBR, and was used in conceptualising the numerical groundwater model.
Appendix 5e - Preliminary Dams Consequence Category Assessment (Engeny 2020a)	Preliminary assessment of the consequence categories of the Project water storage and flood protection structures. The preliminary consequence category assessment was undertaken in accordance with the latest version (Version 5.01) of the Manual for Assessing Consequence Categories and Hydraulic

Title and Appendix	Description
	Performance of Structures ESR/2016/1933 (DES, 2016).
Appendix 6a – Numerical Groundwater Model Technical Summary Report (ELA 2020a)	Executive Summary of the Numerical Groundwater Model and Groundwater Assessment Report (Hydroalgorithmics 2020). Provided to assist the reader given the extensive and technical nature of the Numerical Groundwater Model and Groundwater Assessment Report (Hydroalgorithmics 2020).
Appendix 6b – Numerical Groundwater Model and Groundwater Assessment Report (Hydroalgorithmics 2020)	Regional groundwater model considering the existing hydrogeological values and predicted changes associated with Project activities. Extensively revised compared with the former model. Provides predictions on changes to the existing hydrogeological regime in response to the Project, which in turn was used to inform the assessment of impacts on GDEs.
Appendix 6c. Groundwater Quality Data Summary (Orange Environmental 2020b)	A stand-alone report combining the available groundwater quality (and SWL) data, and providing an analysis of data quality and summary of the data.
Appendix 6d – Technical Report – Investigations on Groundwater – Surface Water Interactions (ELA 2020b)	Groundwater – Surface Water Integrated model providing estimation of water fluxes in the alluvial corridors of the study area. This information is relevant to the assessment of impacts on GDEs. Includes information from bore hole investigations in 2020 of the geological properties of sediments up to 20 m deep in transects across Tooloombah Creek and Deep Creek. Data collected has informed assessments of the permeability of the alluvium and associated risks to GDEs from groundwater drawdown.
Appendix 6e - Central Queensland Coal Groundwater Model Peer Review – Stage 4 (AGE 2020)	Peer Review of the Numerical Groundwater Model and Groundwater Assessment Report undertaken by Hydroalgorithmics (2020).
Appendix 6f – Transient Electromagnetic Survey (Allen 2019)	Agricultural Transient Electromagnetic System (AgTEM) study of the hydrological properties of the Project Area. This provides information on the nature, location and depth of water at various depths across the Project Area. The information is relevant to the Groundwater Model and assessing potential water resources for GDEs and their suitability for use by plants (e.g. salinity).
Appendix 6g - Core Permeability Tests (Groundwater Exploration Services 2020)	Core permeability test data, collected from 2 existing and new drill cores to assist in parameterising the numerical groundwater model (Appendix A6b).
Appendix 6h – Cross Sections of Regolith	Alluvial and regolith stream cross section drilling program results.
Appendix 7 - Central Queensland Coal Project Air Quality Assessment (Vipac Engineers & Scientists 2020a)	Revised Air Quality Modelling undertaken to ensure that changes in the location of Project infrastructure (in particular the movement of MIA 1 and CHPP 1) were accounted for in the impact assessment.

Title and Appendix	Description
Appendix 8 - Central Queensland Coal Project Noise Impact Assessment (Vipac Engineers & Scientists 2020b)	Revised Noise and Vibration assessment undertaken to ensure that changes in the location of Project infrastructure (in particular the movement of MIA 1 and CHPP 1) were accounted for in the impact assessment.
Appendix 9c -Threatened Fauna Investigations – Deep Creek, Central Queensland (Austecology 2020a)	Additional threatened fauna surveys to address issues raised by DES regarding survey adequacy along sections of Deep Creek. Survey program focused on riparian vegetation within and adjacent to the section of Deep Creek downstream of the Bruce Highway, including the area of the proposed haul road crossing near the confluence of Barracks Creek. The survey was implemented over five days and four nights by two ecologists and included diurnal and nocturnal searches to assess the presence of koalas and greater gliders.
Appendix 9d – CQC Project MNES and MSES Fauna Supplementary Impact Assessments (Austecology 2020b)	A supplementary impact assessment to provide further information in regard to koala, greater glider, squatter pigeon and collared delma as requested by DAWE and DES.
Appendix 9e - Significant Species Management Plan, Central Queensland Coal (Austecology 2020c)	A revised Significant Species Management Plan (SSMP) to ameliorate the environmental impacts of the Project on listed species and their habitat, through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and as part of the decommissioning process.
Appendix 9f - 2016 and 2020 Database Searches (DSITIA 2016 & 2020) and (DEE 2016 & 2020)	PMST and Wildlife Online database search results undertaken in 2020 presented with the earlier search results (2016) that were used to inform the earlier assessments.
Appendix 9g - Composite Fauna Species List (2011 to 2019).	Compilation of all fauna species lists from all fauna survey events in 2011, 2012, 2017, 2018 and 2019.
Appendix 10a – Technical Report Groundwater Dependent Ecosystems, Aquatic Ecology, Marine Ecology and the Great Barrier Reef (ELA 2020c)	An updated assessment of the potential Project impacts to GDEs, aquatic ecology, marine ecology and the GBR based on the results of the supplementary work undertaken for SEIS v3.
Appendix 10d – Groundwater Dependent Ecosystem Assessment Central Queensland Coal Project (3D Environmental 2020)	Data analysis of drill cores, soil moisture potential, leaf water potential and stable isotope analysis of xylem water, soil moisture, surface water and groundwater. Undertaken to identify the source of water utilised by trees for transpiration within areas identified as potential GDEs that occur within the area predicted to be affected by groundwater drawdown.
Appendix 10e – Draft Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP) (ELA 2020d)	The Draft GDEMMP describes the mitigation and monitoring measures that will be implemented to manage the impacts of the Project on GDEs. A series of triggers and corrective actions have been developed for each GDE, to facilitate assessments of the impacts of the Project during various development stages, and to inform an assessment

Title and Appendix	Description
	of the suitability of mitigation measures to manage impacts. An adaptive management approach will be implemented, with the results of monitoring relevant indicators for each GDE informing the ongoing re-evaluation of Project impacts and associated mitigation measures.
Appendix 10f – Draft Receiving Environment Monitoring Program (REMP) (ELA 2020e)	A REMP covering monitoring of receiving waters to set an appropriate baseline, detect potential impacts and provide triggers for management actions.
Appendix 10h – Preliminary Isotope Study Results (CQC 2020)	The isotope study results presented in the previous SEIS v2 have been compiled into this technical report.
Appendix 11a – Biodiversity Offset Strategy (BOS) (CO2 Australia 2020a)	CQC has prepared a Biodiversity Offset Strategy as part of SEIS v3 to outline how the Project's anticipated offset requirements will be acquitted, and CQC's approach to delivering these offsets in accordance with the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and Queensland Environmental Offsets Policy (Version 1.8; DES 2020).
Appendix 11b –Draft Offset Delivery Plan (CO2 Australia 2020b).	CQC has revised the draft Offset Delivery Plan as the Project's offsets have been changed since the submission of SEIS v2.
Appendix 11c –Draft Mamelon Offset Area Management Plan (CO2 Australia 2020c).	The Mamelon Offset Area Management Plan (OAMP) has been prepared to guide the ongoing management and monitoring of this offset area, thus satisfying obligations under the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020).
Appendix 11d – Draft [redacted] Offset Area Management Plan (CO2 Australia 2020d).	The [redacted] OAMP has been prepared to guide the ongoing management and monitoring of thisoffset area, thus satisfying obligations under the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020).
Appendix 12 – Draft EMP 2018	The EMP has been updated from that in SEIS v2. The former version contained an outline of the contents for a future EMP. A draft EMP has now been prepared as part of SEIS v3.
Appendix 14a - Economic Model Outputs – Contribution to Economy Tables and Figures (CDM Smith 2018)	Appendix 14a provides 24 tables that were previously included in SEIS v2 Chapter 19A. The full content of these have been removed to the Appendix and they are now presented as summaries within the Chapter to improve readability.
Appendix 14b - Stakeholder Engagement Report (Square Peg Social Performance 2020)	Describes the consultation undertaken for the project prior to the EIS commencing, as well as that undertaken during the EIS and subsequent versions of the SEIS. It also provides an outline of the

Title and Appendix	Description
	Proponent's approach to ongoing community engagement for the life of the project.
Appendix 14c - Social Impact Assessment (Square Peg Social Performance 2020)	Revised Social Impact Assessment undertaken to address comments on SEIS v2, in particular to include additional consultation undertaken in 2019/2020 and to address inconsistencies between the contents of Chapter 19A Economic and Chapter 19b Social.
Appendix 15a – Draft Erosion and Sediment Control Plan (Engeny 2020b)	The Draft Erosion and Sediment Control Plan (ESCP) is a conceptual plan that consolidates the proposed strategies and information related to erosion and sediment control for the Project and provides the framework for development of an ESCP that will be required under an Environmental Authority when approvals are obtained. The draft ESCP has been prepared by a Certified Professional in Erosion and Sediment Control (CPESC).
Appendix 15b – Styx Catchment Sediment Budget for the Great Barrier Reef (Engeny 2020c)	Sediment budget for the Project, describing the increases and decreases in sediment discharges to water arising from Project activities including offsets, and the net sediment discharges to the GBR. This information is relevant to assessing the effects of the Project on sediment discharges to the GBR, and the net benefit or impact of the Project in relation to sediment inputs to the GBR.
Appendix 16a. Mine Access Road Civil Drawings (AMEC and Cox Andrew Engineers 2020a).	Civil Drawings for the Mine Access Roads.
Appendix 16b Mine Dam 1 Civil Drawings (AMEC and Cox Andrew Engineers 2020b).	Civil Drawings for Dam 1.
Appendix 16c Mine Haul Road Civil Drawings (AMEC and Cox Andrew Engineers 2020c).	Civil Drawings for the Mine Haul Road.
Appendix 16d MIA, CHPP and Dam 1 Access Road Civil Drawings (AMEC and Cox Andrew Engineers 2020d).	Civil Drawings for the MIA, CHPP and Dam 1 Access Road.

3.3 Project Changes in Response to Comments on SEIS v2

Throughout the EIS and SEIS process, refinement of Project design has sought to further avoid and minimise impacts on environmental values. Since the finalisation of SEIS v2, several additional changes have been made to Project layout (see Figure 3-1), operations and equipment to avoid and mitigate impacts on environmental values. The Project layout changes are shown in Figure 1 and include:

- excising 349 ha from the southern extent of ML 80187 to reduce the overall size of the Project Site
- revising the mine site water management system to increase storage capacity and hence minimise the potential for controlled and uncontrolled releases, while increasing the site water security for operations (see Figure 3-2):
  - as part of the above, consolidating the water storages and increasing the size of Dam 1 within areas of non-remnant vegetation and

  - as part of the above, commitment to source all water required for the Project from on site capture and reuse (i.e. no water abstraction proposed).
  - complete removal of Dam 2 to avoid impacts on least concern RE 11.3.27 (freshwater wetlands) and of concern RE 11.4.2.
  - avoidance of impact to 1% AEP floodplain area by removal of previous Dam 2.
  - movement of MIA 2 and CHPP 2 to be adjacent to Dam 1, thus avoiding the need for a separate environmental dam and allowing for removal of the former Environmental Dam 2C from the floodplain.
  - relocating Environmental Dam 2D from within an area of concern RE 11.3.4 into non-remnant areas adjacent to the Haul Road.
- relocating the haul road which has removed it from the 1% AEP area on the west side of the Deep Creek crossing, and since it coincided with the Dam 2 wall, also avoid impacts to RE 11.3.35 and RE 11.3.27, which are Least Concern, and RE 11.4.2, which is Of Concern. The new haul road location avoids impacts to remnant REs
- retracting the Open Cut 2 pit northern end wall by 40 m to the south to increase the buffer between the mine and endangered RE 11.3.11
- redesigning, reconfiguring or removing the former Waste Rock Stockpiles in order to minimise the area of disturbance, best facilitate later reworking to achieve reduced landform slopes post-mining, and locating them out of the flood zone to the greatest extent possible
- commitment to not undertake construction activities at night to avoid night time noise disturbance to the nearest sensitive receptors and
- a commitment to replace three haul truck models previously proposed, with a quieter fleet.

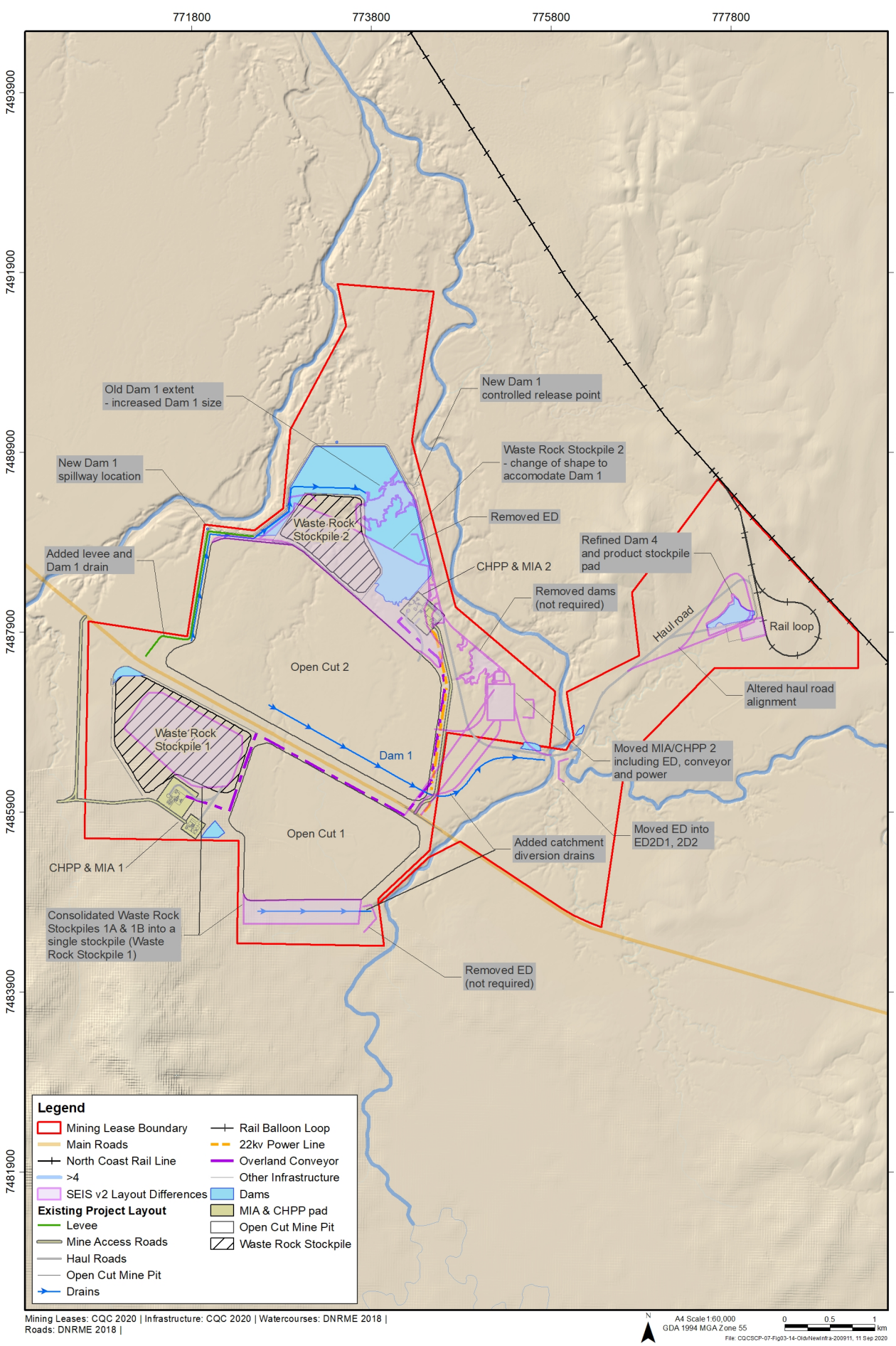


Figure 3-1: Project layout changes between SEIS v2 and SEIS v3

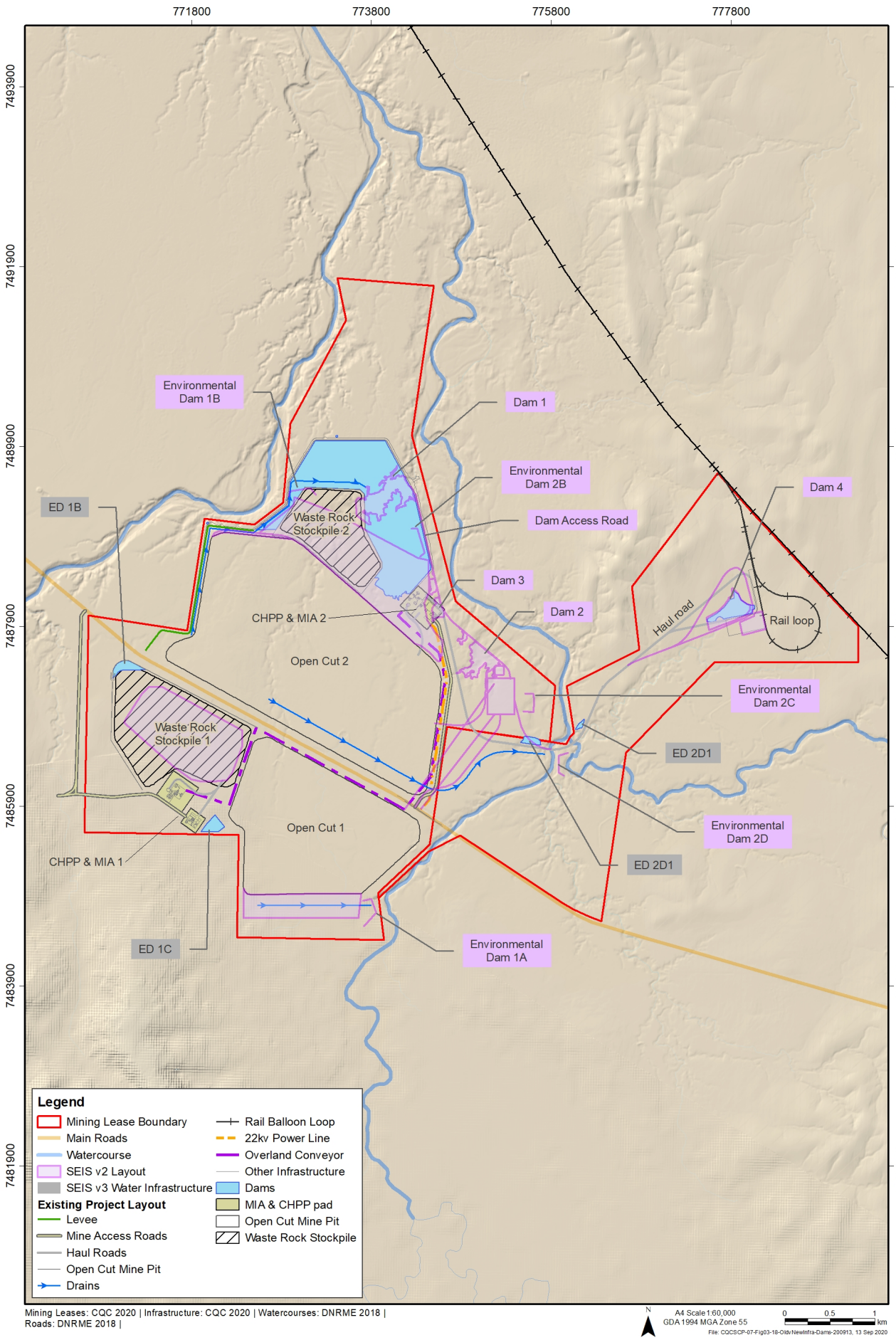


Figure 3-2: Project water infrastructure changes between SEIS v2 and SEIS v3

3.4 Major Changes to the SEIS Document (SEIS v2 Compared to SEIS v3 Document)

This SEIS has sought to follow the layout of previous versions to assist the readers in undertaking their adequacy review. However, as mentioned above, a large body of work has been undertaken to inform this SEIS and as such, there have been substantial changes to the document in many chapters. Therefore, to assist the reader, this section provides an overview of the major changes to the SEIS document, as compared with the previous SEIS v2.

3.4.1 Volumes and Chapters of the SEIS

The SEIS v3 is now organised as into three volumes as follows:

- Volume 1 - Project Overview
- Volume 2 - SEIS chapters and
- Volume 3 - SEIS appendices.

3.4.1.1 Volume 1

The Executive Summary, Table of Contents and Glossary are now placed within Volume 1 - Project Overview.

The Executive Summary has been rewritten to reflect the overall changes to the SEIS.

3.4.1.2 Volume 2

The previous Chapter 1 – Introduction, Chapter 2 – Project Needs and Alternatives and Chapter 3 – Project Description are now condensed into Chapter 1 – Introduction and Project Description.

Chapter 2 is now 'Legislation and Approvals', and Chapter 3 is now this chapter, provided to assist the reader in undertaking the adequacy review.

Chapter 4 – Climate is now Chapter 4 – Climate and Climate Change.

Chapter 15 – Aquatic Ecology is now Chapter 15 – Aquatic and Marine Ecology.

Table 3-2 below details the major changes in each chapter.

Table 3-2: SEIS v3 volume 2 – chapter contents

Chapter	Chapter Title	Major Changes
1.	Introduction and Project Description	This chapter is a merge of the former SEIS v2 Chapter 1 – Introduction, Chapter 2 – Project Needs and Alternative and Chapter 3 – Project Description. This chapter has been completely rewritten with reference to the changes that have been made to the Project as a result of addressing the agency comments on the SEIS v2. In terms of Project Alternatives, Chapter 1 also makes reference to Appendix 2, a new Appendix which contains the assessment of the Project alternatives, including changes that have occurred as part of this SEIS.
2.	Legislation and Approvals	This chapter provides the updated legislation, policies and guidelines applicable to the project and details the secondary approvals that will be required. In the former SEIS v2 this information was contained in Chapter 1 – Introduction.

Chapter	Chapter Title	Major Changes
3.	Response to Agency Comments and SEIS Changes	This new chapter is provided to describes the Project changes that have arisen, and the additional work undertaken to address the agency comments regarding the SEIS v2. It gives a response to each comment received regarding the SEIS v2.
4.	Climate and Climate Change	This chapter has been updated to include the climate information given in the technical reports that were commissioned for this SEIS v3 (e.g. air quality, noise, groundwater assessments, flood and site water balance studies). The greenhouse gas assessment was also updated as part of the revised air quality modelling undertaken for SEIS v3, and this chapter includes the results of that assessment as well.
5.	Land	This chapter has been updated based on the Land Suitability Assessment presented in Appendix A3a, which incorporates the data presented in the SEIS v2, and also includes the detailed data from 2012. A review of the geology and soils information, overlaid with the latest groundwater drawdown extent, enabled confirmation that no ASS will be disturbed - a detailed justification for this is included. The sediment load assessment and assessment against the Reef 2050 Water Quality Targets have been removed, as it is more suitable to address elsewhere (Chapter 9 - Surface Water, Chapter 15 - Aquatic and Marine Ecology). Since ASS will not be impacted, and the draft ESCP has been developed (included in Appendix A15a), management for ASS has been removed (an ASSMP for incidental discovery and works closer to the coastal zone is included in the draft EMP) and for ESC has been summarised down to the essential elements. ESC is not addressed in as fulsome a detail as previously, as other with reference to erosion, it is considered more pertinent to surface water issue (and so addressed in Chapter 9 - Surface Water).
6.	Traffic and Transport	This chapter is essentially unchanged, but has been reviewed and updated where required to reference the most current legislation, policies and guidelines. It also references the updated geotechnical assessment for the Bruce Highway (Appendix 4b) and provides updated intersection drawings for the western mine access road. It also includes commitments to update, finalise and submit a number of plans and assessments to DTMR.
7.	Waste Management	This chapter is essentially unchanged, but has been reviewed and updated where required to reference the most current legislation, policies and guidelines.
8.	Waste Rock and Rejects	This Chapter has been updated to reflect the updated technical assessment provided in the Geochemical Assessment by RGS Environmental, included in Appendix A3b, which provides RGS' assessment of their earlier results from 2011/2012, and incorporates newer data collected during the SEIS v2.
9.	Surface Water	This chapter has been completely rewritten to incorporate the information from a number of studies undertaken to support the SEIS v3.
10.	Groundwater	This chapter has been completely rewritten to incorporate the information from a number of studies undertaken to support the SEIS v3.
11.	Rehabilitation and Decommissioning	This chapter has been largely rewritten to reflect the changed post-mining grazing landuse, and incorporates the findings of the updated Geochemical Assessment in Appendix A3b, the updated Land Suitability Assessment in Appendix A3a, revisions to final landforms to provide better long term stability and lower flood impacts, and the Land Stability

Chapter	Chapter Title	Major Changes
		Assessment in Appendix A3c. A revised strategy that aligns with the PRCP to be prepared post-approval and revised completion criteria have also been provided.
12.	Air Quality	The air quality modelling was revised as part of SEIS v3 to ensure that any impacts arising from the movement of Project elements (in particular, the movement of MIA 2 and CHPP 2) were assessed. As such this chapter has been rewritten to reflect the latest modelling and impact assessment. As per the previous version SEIS v2, there are no predicted exceedances of any air quality criteria at any sensitive receptor.
13.	Noise and Vibration	The acoustic modelling was revised as part of SEIS v3 to ensure that any impacts arising from the movement of Project elements (in particular, the movement of MIA 2 and CHPP 2) were assessed. As such this chapter has been rewritten to reflect the latest modelling and impact assessment. The modelling also included an assessment of alternative equipment to provide noise amelioration. Commitments are made to utilise technology and equipment that will provide for further mitigation of noise impacts.
14.	Terrestrial Ecology	This chapter has been completely rewritten to incorporate the information from a number of studies undertaken to support the SEIS v3.
15.	Aquatic and Marine Ecology	This chapter has been completely rewritten to incorporate the information from a number of studies undertaken to support the SEIS v3.
16.	Matters of National Environmental Significance	This chapter has been completely rewritten to incorporate the information from a number of studies undertaken to support the SEIS v3.
17.	Biosecurity	This chapter is essentially unchanged, but has been reviewed and updated with reference to the current legislation, policies and guidelines.
18.	Cultural Heritage	There has been no material change to this chapter.
19a.	19A CQC Economic	There has been no material change to this chapter. The previous version contained a large amount of tabulated information which has now been included as Appendix 14a. The tabulated information is retained unchanged in Appendix 14a and is summarised and referenced as required in Chapter 19A.
19b.	19B CQC Social	This chapter has been completely rewritten to reflect the new Social Impact Assessment that was undertaken to support this SEIS v3.
20.	Health and Safety	This chapter is essentially unchanged, but has been reviewed and updated where required to reference the most current legislation, policies and guidelines.
21.	Hazard and Risk	This chapter is essentially unchanged, but has been reviewed and updated where required to reference the most current relevant statistical information, legislation, policies and guidelines.
22.	Key Commitments	This chapter has been updated in line with the changes to the Chapters as described above.
23.	Draft EA Conditions	This Chapter has been updated to address EA related comments provided in relation to SEIS v2. Amendments have also been made to conditions, where required, to better reflect model mining conditions and outcomes of the revised impact assessment.
24.	References	This chapter has been updated in line with the changes to the Chapters as described above.

3.4.1.3 Volume 3

As described above in Section 3.2, a number of studies have been commissioned to support this SEIS v3. As such, the majority of appendices are new, and accordingly several older appendices from the previous SEIS have been superseded. Appendices retained from the earlier SEIS v2 are denoted in italics.

Table 3-3: SEIS v3 volume 3 – appendix contents and changes

Appendix Number/Title	Sub Appendix number /Name	Appendix Number/Title	Sub Appendix number /Name
Appendix 1. Central Queensland Coal Project Terms of Reference	n/a	**Appendix 9. Terrestrial Ecology, (cont.)**	A9f. 2016 and 2020 Database Searches
Appendix 2. Project Alternatives Considered	n/a		A9g. Composite Fauna Species List (2011 to 2019).
Appendix 3. Land, Soil and Geochemistry	A3a. Land Suitability Assessment		*A9h. Migratory Shorebird Counts in Broad Sound.*
	A3b. Geochemical Assessment	**Appendix 10. Aquatic Ecology, Marine Ecology, Groundwater Dependent Ecosystems and the Great Barrier Reef**	A10a. Aquatic and Marine Ecology, Groundwater Dependent Ecosystems and the Great Barrier Reef Impact Assessment
	App 3c. Land Stability Assessment		*A10b. 2011 Baseline Monitoring Program*
Appendix 4. Road and Traffic Studies	*A4a Road Impact Assessment*		*A10c. Stygofauna Assessment*
	A4b Geotechnical Assessment		A10d. Groundwater Dependent Ecosystem Assessment
	A4c Draft Road-Use Management Plan		A10e. Groundwater Dependent Ecosystem Management and Monitoring Program
Appendix 5. Surface Water	A5a. Surface Water Quality Technical Report		A10f. Receiving Environment Monitoring Program
	A5b. Flood Study and Water Balance		*A10g. 2018 Waterway Barrier Works Map Amendment Request*
	A5c Draft Mine Site Water Management Plan		A10h. Preliminary Isotope Study Results
	A5d Fluvial Geomorphology		A10i Estuarine Benthic Study
	A5e. Preliminary Dams Consequence Category Assessment	**Appendix 11. Offsets**	A11a. Biodiversity Offset Strategy
Appendix 6. Groundwater	A6a. Groundwater Model Report Summary.		A11b. Draft Offset Delivery Plan.

Appendix Number/Title	Sub Appendix number /Name	Appendix Number/Title	Sub Appendix number /Name
	A6b. Groundwater Model and Assessment Report		A11c. Draft Mamelon Offset Area Management Plan
	A6c. Groundwater Quality Data Summary		A11d. Draft [redacted] Offset Area Management Plan
	A6d. Surface Water/Groundwater Interactions Report	**Appendix 12. Draft EMP**	n/a
	A6e. Numerical Groundwater Model Peer Review	**Appendix 13. EIS and SEIS v1 Submissions Register**	n/a
	A6f. Transient Electromagnetic Survey	**Appendix 14. Socio-Economic**	A14a. Economic Model Outputs – Contribution to Economy Tables and Figures
	A6g. Core Permeability Tests		A14b. Stakeholder Engagement Report
	A6h – Cross Sections of Regolith		A14c. Social Impact Assessment
Appendix 7. Air Quality and Greenhouse Gas	n/a	**Appendix 15. Erosion and Sediment Controls**	A15a. Draft Erosion and Sediment Control Plan
Appendix 8. Noise and Vibration	n/a		A15b. Styx Catchment Sediment Budget
Appendix 9. Terrestrial Ecology	*A9a. 2011-2012 Terrestrial Fauna Reports*	**Appendix 16. Construction Design Drawings**	A16a. Mine Access Road Civil Drawings
	A9b. 2011 Flora and Vegetiaton Assessment		A16b Mine Dam 1 Civil Drawings
	A9c. Threatened Fauna Investigations – Deep Creek		A16c Mine Haul Road Civil Drawings
	A9d. MNES and MSES Supplementary Impact Assessments		A16d MIA, CHPP and Dam 1 Access Road Civil Drawings
	A9e. Significant Species Management Plan		

3.5 Summary of Submissions

The proponent received 129 separate comments from six submitters regarding the SEIS Version 2 (dated December 2018). Of these, 125 of the comments were from five Queensland Government Departments with the remaining four comments from one Commonwealth Department. The government agencies and number of comments received from each, are summarised in Table 3-4.

Table 3-4: Number of comments received from each department

Submitter	Number of Comments Received
Qld Department of Agriculture and Fisheries (DAF)	14
Qld Department of Environment and Science (DES)	48
Qld Department of Natural Resources, Mines and Energy (DNRME)	22
Cth Department of Agriculture, Water and the Environment (DAWE)	4
Qld Department of State Development, Manufacturing, Infrastructure and Planning (Office of Co-ordinator General) (OCG)	28
Qld Department of Transport and Main Roads (DTMR)	13
Total	**129**

The majority of the 14 comments from DAF related to fish passage, fish habitat or the potential for impacts to these values as a result of groundwater drawdown.

The 48 comments from the Queensland DES were varied, however most issues were related to one or more of the following: groundwater, surface water, GDEs, vegetation and fauna habitat values, offsets, geotechnical assessments, final landform and rehabilitation and proposed draft Environmental Authority (EA) conditions.

All 22 comments from the Queensland Department of Natural Resources, Mines and Energy (DNRME) stated either “This comment has been addressed in the SEIS” or “Noted”, indicating that the agency was materially satisfied with the responses to their previous comments.

The Commonwealth Department of Agriculture, Water and the Environment (DAWE’s) comments were addressed to multiple disciplines, primarily focusing on the accuracy of previous groundwater modelling and relevant impacts to Matters of National Environmental Significance (MNES) related to the Project.

All 28 comments made from the Office of the Co-ordinator General were associated with socio-economic matters.

The Queensland Department of Transport and Main Roads (DTMR’s) 13 comments were aimed at traffic and transport aspects, mainly directed at previous traffic and road safety risk assessments.

A graphic representation of the issues raised in the comments is provided in Figure 3-3. Many comments covered more than one discipline, so for comments in which multiple disciplines were encompassed, each discipline was included. Therefore, the sum of the issues raised is larger than the number of comments raised.

It should be noted that for some comments, the previous submissions from the regulator were reviewed in order to ensure that original comments from 2017 and 2018 plus comments from 2019 have been addressed in full.

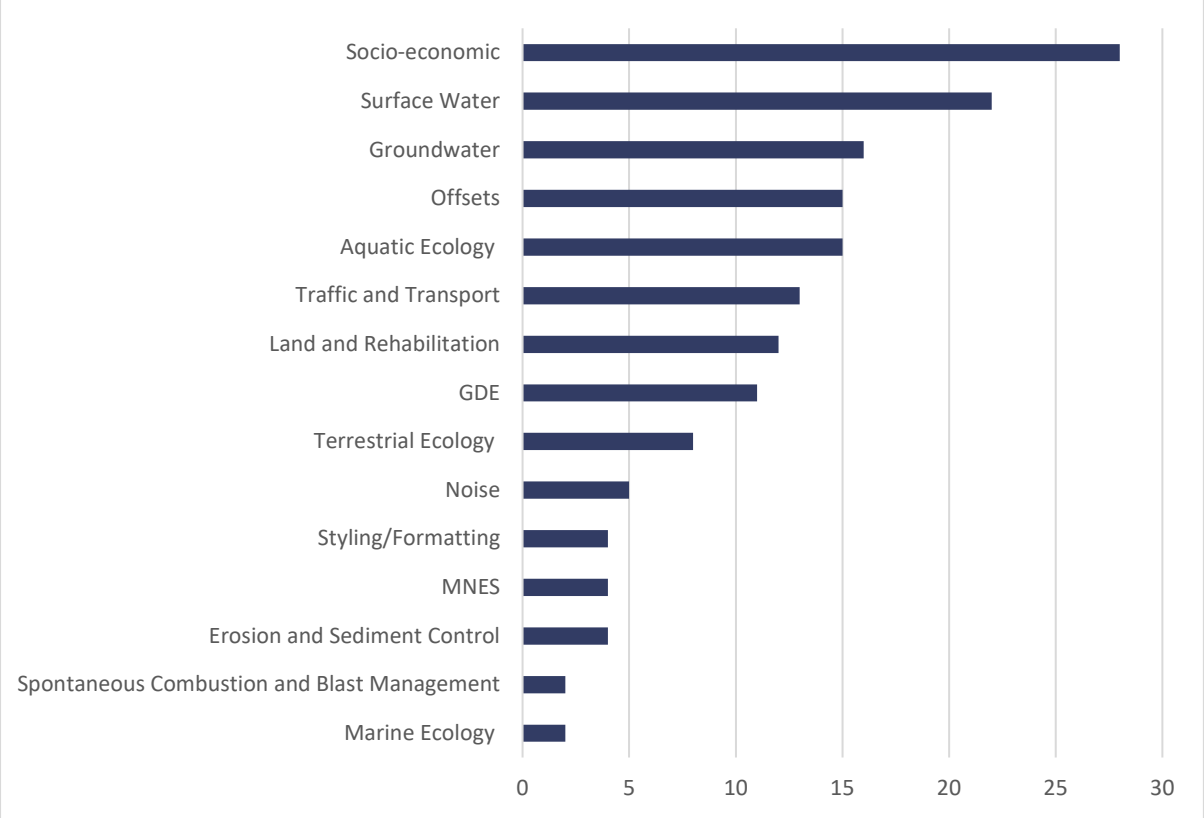


Figure 3-3: Issues raised by six government departments in relation to the SEIS v2

3.6 Response to Agency Comments

This section provides the comments given within the submissions from each agency, and gives a response to each comment. Note that where comments are extensive and refer to a number of issues, they have been split into sub sections to enable responses to be made to each.

3.6.1 Queensland Department of Agriculture and Fisheries

3.6.1.1 Comment 1

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Overall Response and Concerns
Submitters Reference (if provided)	-		

Details of the Submission

The drop in base flows to Tooloombah Creek and Deep Creek will cause the loss of permanent and ephemeral pools. This loss will reduce the fisheries resources in the vicinity of the project. It is uncertain if supplementary water inputs would be sufficient to maintain this system and if this mechanism is able to be continued until the mines impacts cease.

The impacts of the reduction in base flows in the estuarine areas connected to these systems has not been quantified.

The area has been recognised as being a significant nursery for species that are of importance to recreational, commercial and Indigenous fishers. The applicant needs to engage with these sectors and demonstrate negotiated agreements.

The drawdown causing the mobilisation of the groundwater-saltwater interface is of particular concern as it can potentially negatively impact large areas of brackish and freshwater fish habitats as well as the Broad Sound Declared Fish Habitat Area (FHA). This impact is likely to be expressed to the greatest extent, a decade or more post the closure of the mine. Once such a delayed impact manifests how can it be halted?

Suggested solutions, Recommendations and Conditions

-

Proponent Response

3.6.1.1.1 **The drop in base flows to Tooloombah Creek and Deep Creek will cause the loss of permanent and ephemeral pools. This loss will reduce the fisheries resources in the vicinity of the project. It is uncertain if supplementary water inputs would be sufficient to maintain this system and if this mechanism is able to be continued until the mines impacts cease.**

This revised SEIS has assessed the potential for drawdown of groundwater to impact on baseflow duration, as well as water quantity and persistence of pools. It has also assessed the potential for changes to groundwater to affect water quality in pools, and impact riparian vegetation, that may depend on groundwater, affecting the stability of banks (see Chapter 15 and Appendix 10a). The impact assessments are informed by the results of a new regional groundwater model (HydroAlgorithmics 2020), surface water model (WRM 2020) and a study of interactions between surface waters and groundwater (ELA 2020b).

Central Queensland Coal (CQC) has revised the Project description since submission of the SEIS and is no longer proposing to supplement natural stream flows to support aquatic ecosystems and riparian vegetation.

As discussed in Section 9.6.2.1 of Chapter 9 – Surface Water, an assessment of changes to flow within the streams as a result of a reduction in baseflow found the impact to be negligible, and that there would be no impact on the number of days that flow occurs in the receiving watercourses.

As discussed in Section 9.3.4.5 of Chapter 9 – Surface Water, some of the pools within Tooloombah Creek, and possibly in the lower reaches of Deep Creek, are potentially supported by groundwater that may be reduced due to Project related groundwater drawdown.

Modelling work was undertaken by ELA to investigate the mechanisms of groundwater-surface water interactions (refer to the Surface Water / Groundwater Interactions Report in Appendix A6d). The work undertaken by ELA drew upon the revised groundwater modelling and impact assessment (Appendix 6b), the revised flood study and water balance (Appendix 5b) as well as additional work undertaken by ELA and CQC (see Appendix 6d). The finding of the aforementioned studies with reference to aquatic ecosystems are summarised in Chapter 15 - Aquatic and Marine Ecology. ELA concluded that Tooloombah Creek is groundwater fed, in some locations, but primarily from bank

storage1, and this is evident particularly in the stretch adjacent to the Project site (refer to Chapter 15, but also to Section 9.3.4.5 of Chapter 9 – Surface Water). Deep Creek also feeds wet season and flood flows into bank storage, but due to differing geology, this is much lower in magnitude, and bank storage return flow may not reach the creek in some areas. In particular, they conclude that pools are unlikely to be sustained during the dry season in this area of Deep Creek.

As summarised in Section 10.3.7 of Chapter 10 – Groundwater, the available data (observed pools persistence, water quality data particularly EC and water level changes over time, lithological descriptions and groundwater levels in alluvial and regolith cross sections across the creeks) supports increasing persistence of pools moving downstream (i.e. downstream of the Project site) in Tooloombah Creek; the lack of persistence in Deep Creek (other than potentially downstream near the confluence); the primary source of baseflow to pools being bank flow return rather than the dry season water table, which is typically lower than the creek bed, and saline water sourced from seasonally elevated water tables – the exception to this is some locations where the Styx Coal Measures outcrop into these pools (particularly the pool identified at the location of the stream flow gauge).

Essentially, the assessments and the data above show that while seasonally elevated water tables recharge bank storage, which feeds back to the pools during part of the dry season, the water table declines typically to below the creek bed during the dry season, and so an unsaturated zone exists underneath most sections of the creeks. Therefore, direct drawdown impacts on the pools within both creeks are unlikely – i.e. since water table aquifers do not supply the creeks in the dry season directly, and since an unsaturated zone exists underneath the creeks (the water table is already below the base of the creeks), any further drawdown within the water table would not change this, and seepage would remain limited by the existing rate of infiltration from the creeks.

WRM undertook an assessment of the impact to the Tooloombah Creek stream gauge pool of reducing the modelled groundwater inflow. This showed that reducing the groundwater inflow to zero, the pool would continue to contain water about 96% of the time, only drying out during major drought conditions. Further modelling assuming an enhanced leakage from the pool (by 9 kL/day), would result in the pool drying out 30% of the time. However, this may be conservatively high, given the sediments in these locations have a low permeability (reducing the potential for enhanced leakage), and also given the importance of bank storage within these systems, which is not accounted for in the modelling. As such, the actual impacts of groundwater drawdown as a result of the Project are expected to be much lower than predicted, and the pool would either remain perennial, or become semi-permanent, drying out during particularly dry periods.

The primary mode of impact would therefore be the lowering of the water table in proximity to the Project in the wet season, by lowering the regional groundwater levels, and reducing the height that the water table reaches. This could have the effect of reducing the amount of water that is supplied by seasonal rise in the underlying water tables, and in effect some bank recharge flow that would otherwise be held in bank storage may be lost to the water table aquifer, rather than returned to the creek. However, since the processes of bank flow storage and return are very local to each reach of

1 In the context of this SEIS assessment bank storage is a temporary source of groundwater stored within the banks of creeks or rivers which is derived from infiltration associated with flooding or rainfall. Water held in bank storage may be released to the adjacent creek or river over varying timescales following the recession of surface water levels. Water can also be held in bank storage for prolonged periods, where it may be accessed by Terrestrial GDEs.

the creeks, and the highly permeable alluvium patchy and discontinuous, the overall effect may be quite small.

A reduction or elimination of groundwater inputs to the creek systems during dry periods may have the resultant effect of reducing the time over which some of the pools persist, however, this depends on the level of connectivity a given pool has with groundwater, and it is known that not all pools have this connection. Changes to the water chemistry of pools is also likely to occur in pools which receive a saline groundwater inflow (whether directly, or as a result of seasonally elevated saline water table inputs to the alluvial bank store), resulting in a more consistent salinity profile in the absence of saline groundwater inputs, which have a more pronounced effect on pool salinity in the dry season. Pools that have a connection to groundwater can be expected to retain their freshwater chemistry <1,500 µS/cm while they persist during the dry season in the event that saline groundwater inflows are reduced or cease as a result of the Project. Each pool is likely to be affected in a different way, as a function of its size (length, width and depth), habitat features and types of fauna it supports, amount of groundwater drawdown predicted to occur in its location, and the degree to which groundwater currently supports the pool under baseline conditions.

Chapter 15 – Aquatic and Marine Ecology assesses the potential impacts of the changes to groundwater flow regime on Aquatic Groundwater Dependent Ecosystems (GDEs) (i.e. ecosystems dependent on the surface expression of groundwater). Section 15.3.4 describes the existing Aquatic GDEs, Section 15.4.2 discusses the potential impacts to Aquatic GDEs, and Section 15.6.2 provides the impact assessment.

The impact assessment found that the impacts of groundwater drawdown on Aquatic GDEs is expected to be relatively minor because:

- Drawdown at Tooloombah Creek is relatively small (<4 m) and the sediments in these locations have a low permeability (reducing the potential for enhanced leakage).
- Bank storage at Tooloombah Creek is unlikely to be significantly affected by groundwater drawdown. This is because any downward movement of water held in bank storage is restricted, to some extent, by the impermeable layer of weathered clay underlying the alluvium of Tooloombah Creek. In addition, because drawdown of the water table aquifer at Tooloombah Creek is relatively small (a maximum of 4 m) and sediments at these locations have a low permeability, the potential for enhanced leakage is reduced.
- The persistence of bank storage and associated return flows to Tooloombah Creek are likely to provide safeguards to mitigate impacts on pool persistence from drawdown of the water table underneath the creek. Flows from bank storage were predicted to reach the creek for a period of approximately 150 days, even after drawdown.
- Permanent pools are likely to still persist throughout most of the dry season, even under the worst-case scenario, with improvements in water quality (i.e. less variation in salinity).
- Most pools at Deep Creek are ephemeral. Whilst ephemeral pools may dry up more quickly and for longer than under existing conditions, especially in the middle reaches of Deep Creek, these pools experience a natural cycle of drying under existing baseline conditions, and the aquatic ecosystem is adapted to these cycles.
- Recolonisation of pools will occur naturally as it currently does under existing conditions following rainfall, once the creeks begin flowing again. Flow currently occurs approximately 24% of the time and will not be affected by the Project. In addition, aquatic fauna recorded in pools

during field surveys are all common species considered typical of a Central Queensland coast catchment, so there will not be any impacts on threatened aquatic fauna.

- Groundwater drawdown is not predicted to occur beneath the Styx River and therefore loss of potential baseflow to Aquatic GDEs in downstream areas is not considered to be a potential impact of the Project.

Note that water will likely always remain in proximity to the Deep and Tooloombah Creek confluence, as this area is affected by peak tides, and is not affected by drawdown (refer to Figure 10-66 and Section 10.5.1.2.2 in Chapter 10 – Groundwater).

The impact assessment has predicted that some elements of the vegetation community, that groundwater drawdown would result in at least a 'Possible' likelihood of there being a 'Minor' impact on vegetation within three stream reaches along Deep Creek. The area predicted to be possibly affected consists of 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4. The assessment demonstrates that impacts on vegetation as a result of groundwater drawdown are likely to vary in scale along the different stream reaches. For the majority of the 165 ha expected to potentially be affected, impacts are likely to manifest as a gradual reduction in BioCondition scores, canopy cover and canopy height. In some areas vegetation may no longer meet the Regional Ecosystem description, however, will continue to provide ecosystem services, including minimising erosion and some fauna habitat, but with elevated weed cover. Impacts can be expected to commence over timeframes of 10 to 20 years after commencement of the Project. Based on this assessment, the complete loss of vegetation and ecosystem services, including bank stability, is considered highly unlikely to occur at either Tooloombah or Deep Creek.

CQC will implement an adaptive management and monitoring program in areas that may be affected, aimed at increasing resilience of the vegetation communities through improved management of weeds and pests, and the removal of access for cattle grazing. In addition, the riparian corridors will be subject to revegetation to increase their width and to replace any loss of major structural elements of the vegetation community with alternative species that are not groundwater dependent. A Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP) has been prepared to guide these remediation, enhancement and monitoring actions (see Appendix 10e).

3.6.1.1.2 The impacts of the reduction in base flows in the estuarine areas connected to these systems has not been quantified.

Groundwater drawdown is not predicted to occur beneath the estuarine areas in the Styx River, and in fact does not extend to (or beyond) the Deep and Tooloombah Creek confluence, and therefore there will be no drawdown related impacts to downstream estuarine areas as a result of the Project (refer to Figure 10-66 and Section 10.5.1.2.2 in Chapter 10 – Groundwater).

The assessment presented in the Flood Study and Water Balance in Appendix A5b and summarised in Section 9.6.2 of Chapter 9 – Surface Water has shown that there will be negligible reduction in flows within the creeks (and therefore the Styx River estuarine areas) as a result of the Project. The change in runoff volume in Tooloombah Creek is estimated at about 0.1% and in Deep Creek about 4%, with the number of flow days in these watercourses not impacted by the Project. Therefore, flow conditions in downstream estuarine areas will not changes as a result of the Project.

In this regard, the ephemeral nature of the creeks and the current flow regimes will remain unchanged, and connectivity along the creek systems for aquatic fauna will not be affected.

Downstream areas including the FHA will continue to be primarily influenced by the tidal regime of the Styx River estuary and the Broad Sound marine environment.

3.6.1.1.3 The area has been recognised as being a significant nursery for species that are of importance to recreational, commercial and Indigenous fishers. The applicant needs to engage with these sectors and demonstrate negotiated agreements.

There is not expected to be any impact on the nursery values, or any other values relevant to aquatic, estuarine and marine species in the areas surrounding and downstream of the Project. CQC has conducted interviews (in October 2019 and March 2020) with locally based fishers in Marlborough, Ogmore, and St Lawrence as part of the revised Social Impact Assessment (SIA) undertaken to support this SEIS. Consultation with these local fishers suggests there are approximately a dozen full time commercial fishers who fish the Broad Sound, including those who come from Stanage and fish Thirsty Creek. The number of recreational fishers was estimated to be around 200. Common species caught are Mud Crab, Barramundi and King Salmon. Fishing is accessed from various locations, including St Lawrence, Stanage Bay, Waverly Creek, a bush boat ramp at Charon Point and the fishing camp near Gordon Head at Glenpraire. As mentioned above, there is not expected to be any changes to baseflow or flow regime as a result of the Project that would affect recreational or commercial fisheries. Nor are there expected to be any impacts to downstream water quality as a result of any controlled or uncontrolled discharges from the Project (see Section 9.6.5 of Chapter 9 – Surface Water). Therefore there is not expected to be any impact on the nursery values, or any other values relevant to aquatic, estuarine and marine species in the areas surrounding and downstream of the Project

3.6.1.1.4 The drawdown causing the mobilisation of the groundwater-saltwater interface is of particular concern as it can potentially negatively impact large areas of brackish and freshwater fish habitats as well as the Broad Sound Declared Fish Habitat Area. This impact is likely to be expressed to the greatest extent, a decade or more post the closure of the mine. Once such a delayed impact manifests how can it be halted?

The Project will not cause a mobilisation of the groundwater-saltwater interface.

Despite the salinity evident in some of the groundwater samples collected at the Project Site and surrounding areas, it has been determined that the salinity in the groundwaters intersected by the Project is derived from regional geochemistry (the Geochemical Assessment in Appendix A3b found that waste rock is saline). If any interface between oceanic saltwater and freshwater does exist within the groundwater in the vicinity of the Project, it will be hundreds of meters below sea level at the location of the pits, or beyond the extent of any drawdown influence from the Project, and would therefore not result in any movement of any interface between seawater and groundwater.

A detailed explanation of the reasoning for the above is provided in Section 10.3.6.7 of Chapter 10 – Groundwater. As discussed in Section 10.5.3 to Chapter 10 – Groundwater, the numerical groundwater modelling has also demonstrated that Project influence on groundwater flow directions diminishes to effectively nil at the Tooloombah – Deep Creek confluence, which is only 2.2 km downstream of the Project, where the theoretical seawater interface surface would be below -280 mAHD, which is well beneath the predicted extent of drawdown. At the Ogmore bridge and WMP29 bore locations, both well outside the drawdown extent, and approximately 4km downstream of the Project, the theoretical fresh-seawater interface is still at least -40 to -80 mAHD. Any fresh-seawater interface at a shallower depth closer to the coast is well beyond the influence of the drawdown zone and any influence of the Project on groundwater flow direction.

3.6.1.2 Comment 2

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 9 Surface Water and Chapter 14 Terrestrial Ecology (S9.6.3, Figure 9-89, pg9-191 and S14.11, pg14- 101)
Submitters Reference (if provided)	-		

Details of the Submission

The Declared FHAs are not correctly mapped. It appears that they have been confused with the Matters of State Environmental Significance (MSES) of waterways providing for fish passage.

As the area has not been recognised the impact of increased tidal incursion due to drawdown (especially in the 10 years post closure of the mine) have not been addressed in the documents provided.

Suggested Solutions, Recommendations and Conditions

Correct Figure 9-93 to display the Broad Sound Declared Fish Habitat Area (FHA-047).

Provide an assessment of the impacts on this MSES including the impacts of the movement of the saltwater interface post mine closure until an equilibrium state is attained.

NOTE: The Broad Sound FHA map is included as an attachment.

Proponent Response

The Broad Sound FHA is presented in 'Figure 15-11: Broad Sound and the Great Barrier Reef World Heritage Area (GBRWHA)' in Chapter 15 – Aquatic and Marine Ecology, and the nearest downstream boundary identified in 'Figure 9-8: Downstream sensitive areas' in Chapter 9 – Surface Water. These figures are also shown below in Figure 3-4 and Figure 3-5.

The boundary has been sourced from the 'Matters of state environmental significance - fish habitat area - A and B areas - Queensland' spatial dataset available from the Queensland Government, dated 19 February 2020 (DES 2020). It is identical in this area to the 'Fish habitat areas – Queensland' spatial data also available from the Queensland Government, dated 7 December 2018 (DES 2018), depicting the outline of declared FHAs.

CQC has commissioned a revised assessment of Project impacts on ecological values located downstream of the Project, including marine ecology, the Broad Sound FHA and the Great Barrier Reef (GBR) (see Appendix 10a). The assessment was informed by several new technical studies, including a regional groundwater model (see Appendix 6b), surface water model (Appendix 5b) and a study of interactions between surface waters and groundwater (Appendix 6d).

Based on these assessments there will be no impact of the Project on the Broad Sound FHA. As described above in the response to Comment 1 in Section 3.6.1.1, there will be no movement of the salt-water freshwater interface, either in groundwater or surface water. Nor are there expected to be any impacts to downstream water quality as a result of the Project.

As detailed in Section 15.6.3.5.1 of Chapter 15 – Aquatic and Marine Ecology - as per the Queensland Environmental Offsets Policy (QEOP) Significant Residual Impact Guidelines (DEHP 2014a), works are considered to result in a significant residual impact to a declared FHA if:

- the works are not for a specific purpose or structure as specified in the guidelines and

- the works will result in a residual disturbance footprint within the declared FHA and/or highly protected zone of a marine park of 40 m^2 or greater in area.

The Broad Sound FHA boundary is located approximately 10 km downstream of the Project Site. The Project will not have a direct impact on the Broad Sound FHA as it does not involve any direct disturbance within the boundary of the FHA. Nor will there be any indirect impacts as a result of changes in flow regimes or water quality (see response to Comment 1 in Section 3.6.1.1, above). The Project will not result in a residual disturbance footprint of 40 m^2 or greater, and the Project will not cause a significant residual impact on this MSES.

3.6.1.3 Comment 3

TOR Category or EIS Chapter	Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 9 Surface Water and; Chapter 14 Terrestrial Ecology (S9.6.3, Figure 9-89, pg9-190)
Submitters Reference (if provided)	-		

Details of the Submission

The figure is incorrectly referenced and incorrect.

Suggested Solutions, Recommendations and Conditions

Reference Figure 9-93 and correct the figure to include the Broad Sound Declared FHA (map attached).

Proponent Response

The Broad Sound FHA is presented in 'Figure 15-11: Broad Sound and the GBRWHA' in Chapter 15 – Aquatic and Marine Ecology. This figure is also shown below in Figure 3-4.

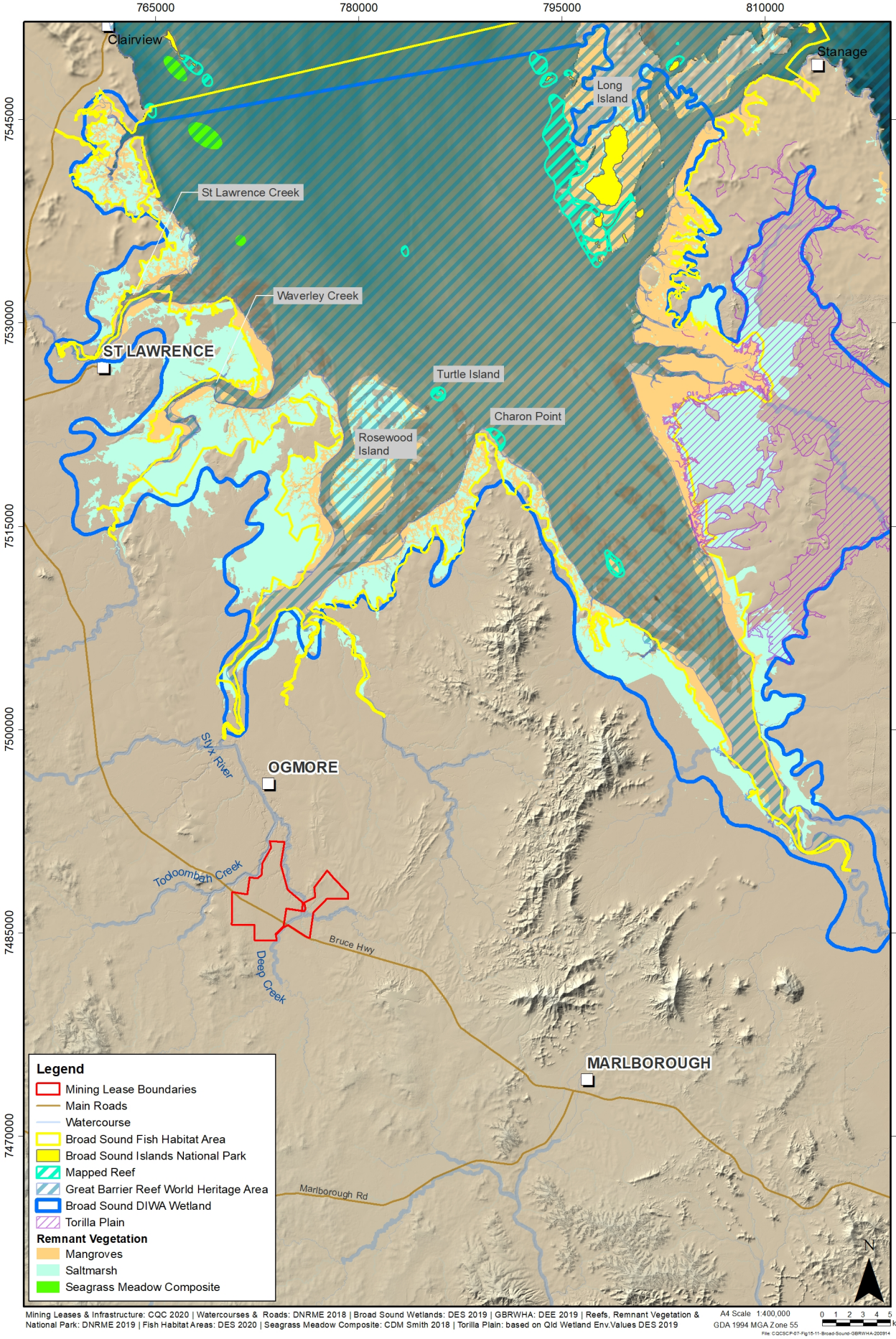


Figure 3-4: Broad Sound and the GBRWHA

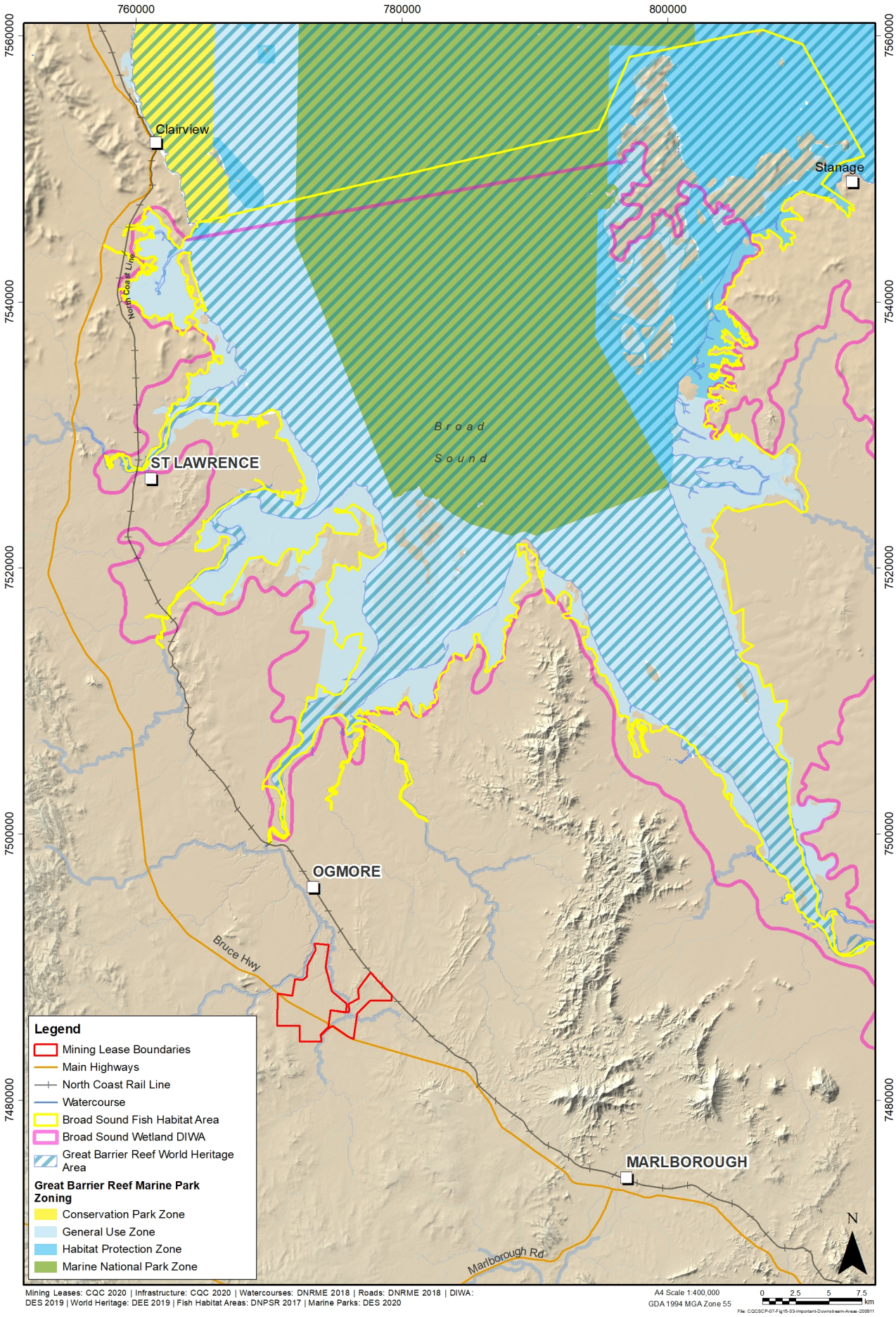


Figure 3-5: Downstream sensitive areas

3.6.1.4 Comment 4

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Chapter 9 Surface Water and; Chapter 15 Aquatic Ecology (S9.2.10, pg9-6 and S15.8.2, pg15-122)
Submitters Reference (if provided)	-		

Details of the Submission

Does not clearly identify that off-lease operational works in waterways are required to adhere Accepted development requirements for operational work that is constructing or raising waterway barrier works or SDAP State Code 18.

Suggested Solutions, Recommendations and Conditions

Include clearer description of the application of Accepted development requirements for operational work that is constructing or raising waterway barrier works and SDAP State Code 18 in areas outside the mining lease. Include Accepted development requirements for operational work that is constructing or raising waterway barrier works as a guide to best practice within the mining lease.

Proponent Response

There are no proposed waterway crossings for the Project outside of the Mining Lease, and this SEIS has committed to the requirement that all waterway crossings within the lease (the proposed haul road crossing of Deep Creek from MIA/CHPP 2 to the TLF) will be designed and constructed in accordance with the requirements of the relevant accepted development requirements for operational work.

In particular, Section 7 of the Aquatic Ecology, Groundwater Dependent Ecosystems, Marine Ecology and the Great Barrier Reef technical report (Appendix A10a) addresses impacts on aquatic ecology values including waterways providing fish passage. Discussion is included regarding compliance with the DAF guidelines - Accepted development requirements for operational work that is constructing or raising waterway barrier works.

The mine haul road will cross Deep Creek and Barrack Creek. Deep Creek is likely to be used for fish passage when flows occur. Barrack Creek is largely an ephemeral waterbody with highly intermittent flows. With appropriate crossing design, including appropriately designed culverts, no barriers to fish passage are anticipated at these crossing points.

Approximately 8.35 km of waterways providing fish passage mapped by the DAF spatial layer will be directly disturbed as a result of the Project. These areas are comprised of highly ephemeral drainage lines that would provide ecological function by facilitating fish passage during periods of high rainfall and flood. This impact is not avoidable, as the areas involved are required for establishment of critical mine infrastructure, so an offset will be applied in accordance with the Queensland Environmental Offset Policy (QEOP) (Version 1.8; DES 2020b). Offsets related to these impacts are addressed in the Project Biodiversity Offset Strategy (see Appendix 11a).

Within the Mining Lease, to ensure aquatic habitat connectivity is maintained, as stated in Section 15.7.1.2 of Chapter 15 - Aquatic Ecology, CQC commits to undertaking detailed design and construction of the road crossing of Deep and Barrack Creeks in compliance with the above guideline, and the following where relevant:

- State Code 18: Constructing or raising waterway barrier works in fish habitats.

- Austroads – Guide to Road Design Part 5B – Open Channels, Culverts and Floodways.
- Design detail requirements of the Code for Self-Assessable Development; Minor Waterway Barrier Works Part 3: Culvert Crossings, Code number: WWWBW01 (April 2013), Department of Agriculture and Fisheries.

3.6.1.5 Comment 5

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology; MNES	Submitters Reference to EIS Section (if provided)	Chapter 10 Groundwater Chapter 15 Aquatic Ecology Chapter 16 MNES (S10.4, pg7) (S10.5) (S10.6) (S10.7.2.1, Table 10-74, pgs217 to 218) (S10.7.3, Table 10-76, pg224) (S10.7.3, Table 10-77, pg225) (S10.7.4.2, Figure 10-82, pg249) (S10.7.4.2, Figure 10-83, pg250) (S10.7.4.8, Table 10-80, pg278) (S10.7.4.8, Table 10-82, pg281) (S15.6, pg15.20) (15.7, pg15-56) (S15.8, pg15-68) (S16.11, pg16-85) (S16.12, pg16-129)
Submitters Reference (if provided)	-		

Details of the Submission

Tooloombah Creek and Deep Creek will be significantly compromised, and their fish habitat values lost. This loss will manifest greatest, post mine closure. The following is paraphrased from the description of figures 10-82 and 10-83 in Chapter 10 on page 248.

Tooloombah Creek:-50% recovery by around 65 years after closure, and the remaining —50% occurring within another 20 years or so; and Deep Creek: —25% recovery by around 60 years after closure, and the remaining —75% occurring within another 20 years or so.

Suggested Solutions, Recommendations and Conditions

It is appropriate to offset the area of Tooloombah Creek and Deep Creek upstream of their junction, as there are Significant Residual Impacts. This area is additional to the area of loss to be offset from within the proposed lease.

Proponent Response

The revised assessments undertaken to support this SEIS demonstrate that Tooloombah and Deep Creek will not be significantly compromised, nor will their fish habitat values be lost. Groundwater drawdown will not result in significant impacts to these creeks, nor will changes in surface water

regimes. Refer to the response to Comment 1 in Section 3.6.1.1, above for the details. As such there will be no significant impact to fish passage in either Tooloombah or Deep Creeks and no offsets are proposed for these waterways (see the full assessment of impacts in Section 15.6.5 in Chapter 15).

However, as described in Section 15.6.5.1 of Chapter 15, two unnamed tributaries of Deep Creek mapped as moderate and low risk waterways for fish passage will be permanently removed through the establishment of Dam 1 and the mine pits, resulting in the permanent loss of aquatic habitat and riparian vegetation (see Figure 3-6 below). Minor impacts will also occur to two low risk tributaries of Tooloombah Creek. Although these waterways are highly degraded and ephemeral and provide minimal value to aquatic species, their removal will reduce the potential for fish passage across 8.35 km of floodplain on the Project Site. Assuming an average stream width of 10 m, impacts to these waterways will result in the removal of 8.35 ha of waterway providing fish passage.

Therefore, the Project will result in a significant residual impact on 8.35 ha of waterway providing fish passage as illustrated in Figure 3-6. To acquit this offset requirement a financial settlement offset is proposed to be made in accordance with the QEOP (Version 1.8; DES 2020b). In accordance with this policy, the financial settlement offset calculator has been used to calculate the cost of this offset. The total cost of the financial settlement for impacts on fish passage is $208,750.00[2]. The details of the financial settlement offset are provided in the Project's Offset Delivery Plan (see Attachment B of Appendix 11b) and following DES approval, payment will be made to the Queensland Government's Offset Fund prior to Project commencement.

2 This amount is based on a combined financial settlement payment for all MSES as presented in Chapter 14 – Terrestrial Ecology. The total payment for all combined MSES offsets is $874,585.65.

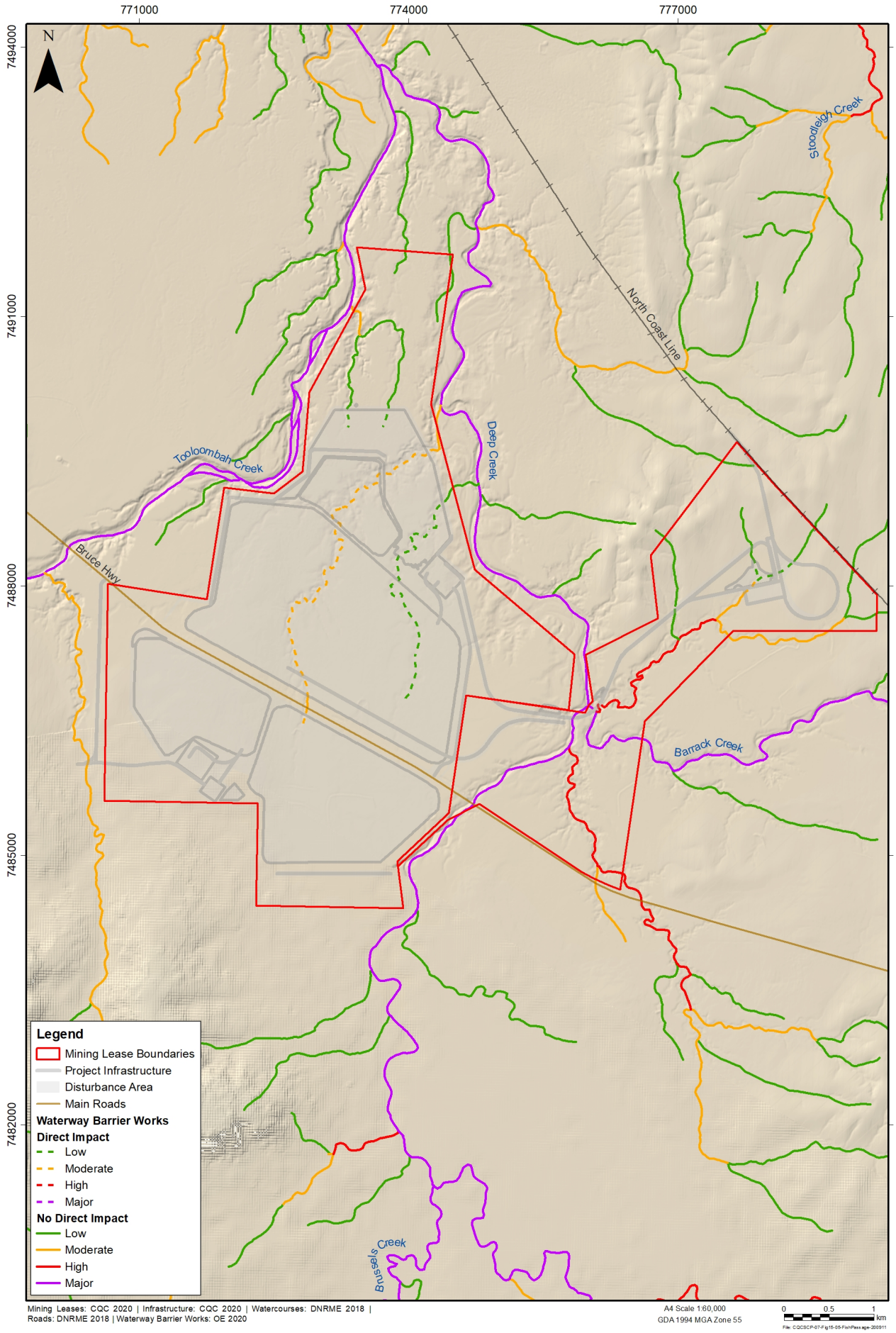


Figure 3-6: Waterway Barrier Works for Fish Passage

3.6.1.6 Comment 6

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 10 Groundwater (S10.7.2.1, Table 10-74, pgs217 to 218) (S10.7.2.2, pgs219 to 20) (S10.7.4.6, pg267)
Submitters Reference (if provided)	-		

Details of the Submission

Depressurisation resulting in mobilization of seawater — freshwater interface.

Modelling has not been presented on the interface location 10 and 20 years post mine closure.

This interaction could negatively impact fish habitat and compromise the Broad Sound Declared FHA.

"The potential for mobilisation of the 'seawater- freshwater' interface at the coast, or along tidal reaches of Styx River and Broad Sound estuary, will depend on extent of depressurization (vertical and lateral) of groundwater system in response to mine dewatering." The figures for 10-93 and 10-94 do not indicate the predicted location of this interface.

Suggested Solutions, Recommendations and Conditions

Provide modelling of the seawater — freshwater interface at relevant intervals for the predicted duration of impacts.

Proponent Response

As described above in the response to Comment 1 in Section 3.6.1.1, the Project will not result in the movement of the salt-water freshwater interface, either in groundwater or surface water.

3.6.1.7 Comment 7

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 10 Groundwater (S10.7.4.8, Table 10-82, pg281)(S10.8.4.5, Table 10-84, pg290)(S10.8.11, Table 10-86, pgs301 to 304) (S10.9.2.4, pgs316 to 317) (S10.9.2.5, pgs317 to 320) (S10.11, Table 10-94, pgs322 to 332)
Submitters Reference (if provided)	-		

Details of the Submission

Mitigation only likely during life of the mine. The waterways that will be impacted have been noted through the applicants work to represent significant nursery habitat for species such as barramundi.

Suggested Solutions, Recommendations and Conditions

The greatest drawdown impacts are post mine closure. There are no indicators of ongoing mitigation of the style proposed in table 10-84. Thus if the project were to proceed, indication of mitigation for the predicted duration of the impacts and in addition offsets, will be required for all predicted impacted streams.

Provide evidence of the suitability of supplementary watering on the base geology of the Styx Basin or similar.

Proponent Response

Supplementary flows are no longer proposed. Table 10-84 of the previous SEIS v2 presented "available mitigation and management measures" to deal with the formerly anticipated reductions in surface water quantity as a result of the Project. As mentioned above in response to Comment 1 in Section 3.6.1.1 the effects of groundwater drawdown on Aquatic GDEs is expected to be relatively minor, and the Project will have a negligible impact on surface runoff volumes draining to Tooloombah and Deep creeks. Hence, flow conditions in the Deep and Tooloombah Creeks are not expected to be significantly affected, so supplementary flows are not required.

Significant residual impacts to the aquatic environment as a result of drawdown are not anticipated (see response to Comment 1 in Section 3.6.1.1). In the long term, recovery of groundwater levels occurs after around 150 years, with further slow elevation of groundwater levels due to mounding effects occurring until stabilisation is reached after another ~ 100 years (refer Section 10.5.1.2.1 of Chapter 10 – Groundwater). This is due to the elevated final landforms providing for enhanced infiltration and the added head pressure of elevated land, and provides, in the long term, for a rise in groundwater in the location of the pits in the order of up to 3 m. Since this mounding is due to the effect of infiltration into the landforms themselves, this would not be expected to result in saline water from deeper aquifers finding surface expression where they previously did not (fresher infiltration waters would have the effect of 'pushing down' saltier waters from deeper layers). The model predicted effect of this mounding is a long term increase in baseflow (or reduction in leakage) in Tooloombah Creek in the order of 0.4 L/s per km, and in the order of 0.07 L/s per km for Deep Creek. Post-mining, when the effects of dewatering cease and local mounding effects and stabilisation occurs, water would flow through the remaining elevated landforms and backfilled pits. However, as noted in Section 10.5.2 of Chapter 10 - Groundwater, this water would still be unlikely to be contaminated and given the material is native rock, would not be anticipated to result in long term changes to groundwater quality.

Significant residual impacts to 8.35 ha of waterway providing fish passage as illustrated in Figure 3-6, above, will occur. To acquit this offset requirement a financial settlement offsets is proposed to be made in accordance with the QEOP (Version 1.8; DES 2020b). See response to Comment 5 in Section 3.6.1.5, above, for further details.

With reference to mitigation and management measures for surface water quality, a Receiving Environment Monitoring Program (REMP) has been prepared (see Appendix 10f). The Draft REMP describes the rationale and salient aspects of a monitoring program for the receiving environment surrounding the Project Site, including the location of monitoring sites, monitoring frequency and

parameters. The REMP is designed to evaluate changes in the quality of the receiving environment, with a focus on surface water quality, sediment quality, aquatic ecology habitat quality, marine ecology habitat quality, macroinvertebrates and fish. Several control and impact sites have been established upstream of, adjacent to, and downstream of the Project.

3.6.1.8 Comment 8

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Chapter 11 Rehabilitation and Decommissioning (S11.7.1.2, pg11-17)
Submitters Reference (if provided)	-		

Details of the Submission

The re-establishment of fish passage at the closure of mining will have little meaning, if the ongoing loss of habitat and upstream pools in Tooloombah and Deep Creeks removes the habitat.

Suggested Solutions, Recommendations and Conditions

Address the 10-year post mine closure rehabilitation (around peak drawdown).

Establish goals with clear performance indicators and time-lines.

Proponent Response

Fish passage in Tooloombah and Deep Creek will not be directly or indirectly impacted as a result of the construction, operation or decommissioning of the Project. Fish passage will not be impacted as a result of post-mine closure groundwater drawdown.

An assessment of the impacts on fish passage is presented in Chapter 15 – Aquatic and Marine Ecology (see Section 15.6.5). The potential impacts on fish passage in relation to Project related surface water and groundwater changes, and establishment of Project infrastructure, are summarised below.

Surface Water Changes

Surface water modelling (see Chapter 9 – Surface Water) found that creeks will continue to flow during construction and operation of the Project, in a similar manner to existing baseline conditions. Local waterways are in a state of flow for approximately 24% of the time under current conditions, and this will not be affected by the Project. As flow conditions under the Project will remain the same as baseline conditions, there will be no obstruction to fish passage from the Project-related surface water changes. Nor will there be any changes to water quality of a magnitude that would affect fish passage (see Chapter 9 – Surface Water).

Groundwater Changes and Impacts on Fish Passage

As described in Chapter 15, Section 16.5.6, groundwater drawdown is not predicted to occur beneath the Styx River and therefore loss of potential baseflow from groundwater sources in downstream areas is not considered to be a potential impact of the Project.

Groundwater drawdown will result in reduced groundwater inputs to some sections of Tooloombah and Deep Creek during the dry season. Pools along Tooloombah Creek, and to a lesser extent Deep Creek, may be affected by groundwater drawdown, drying up faster than they currently do in areas where groundwater inputs are reduced. Changes to water chemistry within pools is also likely to

occur where the influence of saline groundwater inputs is reduced. Water quality within these pools is likely to be less salty over the dry season.

However, permanent pools are still likely to persist throughout most of the dry season, with improvements in water quality (less variation in salinity). Whilst ephemeral pools are likely to dry up more quickly and for longer than under existing conditions, especially in the middle reaches of Deep Creek, these pools experience a natural cycle of drying under existing baseline conditions. The aquatic ecosystem is adapted to these cycles and most biota in these pools are adapted to living in ephemeral streams, reducing the risk of significant environmental impacts. In addition, as described above, recolonisation of pools will occur naturally as it currently does under existing conditions following rainfall, once the creeks begin flowing again. Flow currently occurs approximately 24% of the time and will not be affected by groundwater drawdown. The Styx River will remain an important source for recolonisation of ephemeral creeks located upstream during periods of flow and connectivity.

Establishment of Project Infrastructure

Both Deep and Tooloombah Creek are mapped as major risk waterways for barriers to fish passage. A number of smaller waterways are present within the Project Site and are mapped as low to moderate risk. Only one small section of waterway is mapped as high risk within the Project Site. Two unnamed tributaries of Deep Creek mapped as moderate and low risk waterways for fish passage will be permanently removed through the establishment of Dam 1 and the mine pits, resulting in the permanent loss of aquatic habitat and riparian vegetation (see Figure 3-6). Minor impacts will also occur to two low risk tributaries of Tooloombah Creek. Although these waterways are highly degraded and ephemeral and provide minimal value to aquatic species, their removal will reduce the potential for fish passage across 8.35 km of floodplain on the Project Site. Assuming an average stream width of 10 m, impacts to these waterways will result in the removal of 8.35 ha of waterway providing fish passage.

The haul road will cross Deep and Barrack Creek. Deep Creek is likely to be used for fish passage when flows occur. Barrack Creek is largely an ephemeral waterbody with highly intermittent flows. The works for the haul road will be undertaken in accordance with the DAF guidelines - Accepted development requirements for operational work that is constructing or raising waterway barrier works. With appropriate crossing design, including culverts, no barriers to fish passage are anticipated at these crossing points.

3.6.1.9 Comment 9

TOR Category or EIS Chapter	Terrestrial Ecology; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 14 Terrestrial Ecology (S14.11, Table 14-17, pgs14-101 to 14-104)
Submitters Reference (if provided)	-		

Details of the Submission

Offset areas.

Suggested Solutions, Recommendations and Conditions

See map below.

Proponent Response

Significant residual impacts to 8.35 ha of waterway providing fish passage as illustrated in Figure 3-6, above, will occur. To acquit this offset requirement a financial settlement offsets is proposed to be made in accordance with the QEOP (Version 1.8; DES 2020b).

3.6.1.10 Comment 10

TOR Category or EIS Chapter	Terrestrial Ecology; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 14 Terrestrial Ecology (S14.12, Table 14-112)
Submitters Reference (if provided)	-		

Details of the Submission

Offset of like for like waterways are unlikely to be possible and thus financial offsets are likely for waterways providing fish passage.

Suggested Solutions, Recommendations and Conditions

Offset waterways providing fish passage as financial offset.

Proponent Response

The Project will result in a significant residual impact on 8.35 ha of waterway mapped by the Queensland Department of Agriculture and Fisheries (DAF) spatial layer as providing fish passage (See Figure 3-6). These areas are comprised of highly ephemeral drainage lines that would provide ecological function by facilitating fish passage during periods of high rainfall and flood. This impact is not avoidable, as the areas involved are required for establishment of critical mine infrastructure, so to acquit this offset requirement a financial settlement offset is proposed to be made in accordance with the QEOP (Version 1.8; DES 2020b). In accordance with this policy, the financial settlement offset calculator has been used to calculate the cost of this offset. The total cost of the financial settlement for impacts on fish passage is $208,750.00[3]. The details of the financial settlement offset are provided in the Project's Offset Delivery Plan (see Attachment B of Appendix 11b) and following DES approval, payment will be made to the Queensland Government's Offset Fund prior to Project commencement.

3.6.1.11 Comment 11

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 15 Aquatic Ecology (S15.6.2, pgs15-26 to 15-38)
Submitters Reference (if provided)	-		

Details of the Submission

Broad Sound FHA should be included as a potential impact MSES until it is demonstrated that the post mine closure drawdown, will not impact its fisheries values.

3 This amount is based on a combined financial settlement payment for all MSES as presented in Chapter 14 – Terrestrial Ecology. The total payment for all combined MSES offsets is $874,585.65.

Suggested Solutions, Recommendations and Conditions

Include the Broad Sound Fish Declared Habitat Area (FHAA) in calculations of offsets and impact assessments.

Proponent Response

An assessment of the impact of the Project on the Broad Sound FHA has been undertaken and is presented in detail in Section 15.6.3 of Chapter 15 – Aquatic and Marine Ecology.

Broad Sound FHA is located approximately 10 km downstream of the Project and as such the Project will not result in direct impacts on this area. Groundwater drawdown is not predicted to occur beneath the Styx River or the Broad Sound FHA at any time over the life of the Project, or post closure (refer to response to Comment 1 in Section 3.6.1.1 for more information). Therefore, loss of potential baseflow from groundwater sources in downstream areas is not considered to be a potential impact of the Project. As described above in the response to Comment 1 in Section 3.6.1.1, there will be no movement of the salt-water freshwater interface, either in groundwater or surface water.

A number of assessments have been undertaken to consider the risks to downstream environments, including the Broad Sound FHA, from changes to water quality. These assessments indicate that the risks to downstream environments from sediments and/or high concentrations of water quality parameters contained in controlled or uncontrolled releases from the mine are low. The sediment load assessment using average climatic conditions indicates that the Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This is primarily due to the water management and sediment and erosion control systems for the Project being designed such that sediment-laden water is captured and treated on site. Additionally, current land use practices (cattle grazing) will cease across a large area, both on the Project Site and within upstream areas, thereby also reducing existing sediment and nutrient loads to downstream waters. Based on this assessment the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%. The assessment also considered non-average, very wet, climatic conditions when sediment might be expected to mobilise more readily and found that, even under non-average wet and very wet conditions, the sediment load from the Project will be less than that of current baseline conditions.

A significant impact assessment for the Broad Sound FHA is presented in Section 15.6.3.5 of Chapter 15 – Aquatic and Marine Ecology. As detailed in Section 15.6.3.5.1 of Chapter 15, as per the Queensland Environmental Offsets Policy (QEOP) Significant Residual Impact Guidelines (DEHP 2014a), works are considered to result in a significant residual impact to a declared FHA if:

- the works are not for a specific purpose or structure as specified in the guidelines and
- the works will result in a residual disturbance footprint within the declared FHA and/or highly protected zone of a marine park of 40 m^2 or greater in area.

The Project will not have a direct impact on the Broad Sound FHA as it does not involve any direct disturbance within the boundary of the FHA. Nor will there be any indirect impacts as a result of changes in flow regimes or water quality (see response to Comment 1 in Section 3.6.1.1, above). The Project will not result in a residual disturbance footprint of 40 m^2 or greater, and the Project will not cause a significant residual impact on this MSES.

3.6.1.12 Comment 12

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Chapter 23 Draft EA Conditions (S23.1.8, Table 23-13 pg23-23, Condition # F25)
Submitters Reference (if provided)			

Details of the Submission

The condition does not address the issue of drawdown, the maintenance of productive flows or the creation of REMP as is suggested in response to S7.15 or the impacts identified in S7.16

Suggested Solutions, Recommendations and Conditions

Create condition to meet the requirement for the maintenance of base flow within Tooloombah and Deep creeks.

Proponent Response

The results of the updated groundwater study indicate the potential for small changes to the persistence of some pools in Tooloombah Creek due to predicted drawdown in groundwater levels caused by the Project. Data for one of the existing pools along Tooloombah Creek indicates that the pool currently receives a small, saline inflow that is independent of rainfall. If the Project causes this inflow to cease, this pool may become ephemeral, drying out for about 5% of the time before being refilled by surface runoff. In that scenario, the pool will likely become more fresh due to the absence of a saline groundwater inflow.

Other works summarised in Section 10.3.7 in Chapter 10 – Groundwater, and in the supporting technical reports (referenced in that section), indicate that this particular pool is likely to represent the most connected type of pool, with others in the vicinity being much less, or not, connected to the water table, particularly along Deep Creek and further upstream in Tooloombah Creek. As such, impacts in other areas will likely be much less.

However, in terms of actual flow within the creeks, as detailed in Section 9.6.2.1 of Chapter 9 – Surface Water, WRM undertook an assessment of changes to streamflow as a result of the Project, finding negligible changes to streamflow, and concluding that there will be no impact on the number of days that flow occurs in receiving watercourses.

As such, conditions requiring the maintenance of base flow within the creeks are not required.

A draft Receiving Environment Monitoring Program is provided in Appendix A10f to monitor and detect change in receiving waterways and downstream environments. This (and the Draft Mine Site Water Management Plan in Appendix A5c) includes monitoring of flow to detect changes. Current stream flow gauges will enable good pre-mine data to be collected for before-after assessments to be conducted.

3.6.1.13 Comment 13

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 23 Draft EA Conditions (S23.1.8, Table 23-13, pg23-24, Condition # F29)
Submitters Reference (if provided)			

Details of the Submission

This condition requires rewording, as roughening is required unless the culvert base is buried.

Suggested Solutions, Recommendations and Conditions

Reword Condition # F29 to:

- The roughening of the culvert base is required unless the culvert base is buried. The base to be a minimum of 300mm below bed level and allow natural material to deposit on the culvert base.

Proponent Response

The previous conditions F29 – F31 have been revised to only two conditions, including F29 – compliance with SDAP Code 18, which includes design requirements (and so condition F31 is not considered necessary). Condition F30 has however been retained, and updated as per the suggested solution above. See Chapter 23 – Draft EA Conditions.

3.6.1.14 Comment 14

TOR Category or EIS Chapter	Groundwater; Surface Water; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Executive Summary, Section 3.4; Chapter 10 Groundwater
Submitters Reference (if provided)			

Details of the Submission

The waterways have been reassessed and the area of direct waterway impact have been considered.

This area is included in the mapping below.

Suggested Solutions, Recommendations and Conditions

The figures included below are marked to show areas of waterway that are not considered to offer fish habitat and offsets to be calculated based on this advice.

Proponent Response

Approximately 13.4 km of waterways mapped under the Waterway Barrier Works for Fish Passage mapping spatial layer occur within the Project Area. As part of the SEIS v2, CQC prepared a mapping revision for submission to DAF limiting the impact area to approximately 7 km of waterway providing potential fish passage in the Project Site, on the basis that some of the waterways had been incorrectly mapped and did not provide fish passage (CQC 2018). DAF accepted this revision in their comments on the updated SEIS v2 (March 2019), with the revised mapping displayed in Figure 3-6. Based on changes to the Project Description since 2018, it has been determined that 8.35 km fish passage will be directly impacted by the Project as summarised below and shown in Figure 3-6.

The revised assessments undertaken to support this SEIS demonstrate that Tooloombah and Deep Creek will not be significantly compromised, nor will their fish habitat values be lost. Groundwater drawdown will not result in significant impacts to these creeks, nor will changes in surface water regimes. Refer to the response to Comment 1 in Section 3.6.1.1, above for the details. As such there will be no significant impact to fish passage in either Tooloombah or Deep Creeks and no offsets are proposed for these waterways (see the full assessment of impacts in Section 15.6.5 in Chapter 15).

However, as described in Section 15.6.5.1 of Chapter 15, two unnamed tributaries of Deep Creek mapped as moderate and low risk waterways for fish passage will be permanently removed through the establishment of Dam 1 and the mine pits, resulting in the permanent loss of aquatic habitat and riparian vegetation (see Figure 3-6). Minor impacts will also occur to two low risk tributaries of Tooloombah Creek. Although these waterways are highly degraded and ephemeral and provide minimal value to aquatic species, their removal will reduce the potential for fish passage across 8.35 km of floodplain on the Project Site. Assuming an average stream width of 10 m, impacts to these waterways will result in the removal of 8.35 ha of waterway providing fish passage.

Therefore, the Project will result in a significant residual impact on 8.35 ha of waterway providing fish passage. To acquit this offset requirement a financial settlement offset is proposed to be made in accordance with the QEOP (Version 1.8; DES 2020b). In accordance with this policy, the financial settlement offset calculator has been used to calculate the cost of this offset. The total cost of the financial settlement for impacts on fish passage is $208,750.00[4]. The details of the financial settlement offset are provided in the Project's Offset Delivery Plan (see Attachment B of Appendix 11b) and following DES approval, payment will be made to the Queensland Government's Offset Fund prior to Project commencement.

3.6.2 Queensland Department of Environment and Science

3.6.2.1 Comment 1

TOR Category or EIS Chapter	Executive Summary; Groundwater	Submitters Reference to EIS Section (if provided)	Executive Summary, Section 3.4; Chapter 10 Groundwater
Submitters Reference (if provided)	Comment 1; Table 1; 32.1		

Details of the Submission

Additional information regarding Groundwater Dependent Ecosystems (GDEs) and water supply is still required to address the supplementary environmental flows mitigation measure.

There is very limited available groundwater data, including groundwater levels, historical trends, the historical behaviour of groundwater levels and potential connectivity to surface water flow.

Due to the absence of groundwater recharge data, the EIS used a method called "method of last resort" (MOLR) to estimate groundwater recharge, plus some additional inferences that stream flow would also contribute to recharge within the streams.

Historical surface water stream flow within both Deep Creek and Tooloombah Creek also remain unknown (i.e. no gauging data). It remains unclear how potential impact on flow regimes (and

4 This amount is based on a combined financial settlement payment for all MSES as presented in Chapter 14 – Terrestrial Ecology. The total payment for all combined MSES offsets is $874,585.65.

recharge) would be measured, monitored or conditioned. It is proposed to monitor stream flow, and this must be conditioned in the EA, with the addition of water quality.

A long-term assessment of alluvium and Styx Coal measure overburden groundwater levels is required to fully understand groundwater interactions. The EIS states that this will be collected.

Evidence has been provided that indicates that there are direct relationships between surface water pools and groundwater, including depth to groundwater, hydraulic gradients feeding surface waters, water chemistry and radon isotopes. On this basis, in stream pools are considered likely to be impacted by the mine dewatering and the EIS proposes monitoring and mitigation measures will be required.

Proposed mitigation measures include supplementing supply during the life of the mine with excess treated mine site water. However, to make up the shortfall post mine closure, supplying water to the streams from the Styx Coal measures is proposed. The utilisation of solar power to power the pumps is discussed, however the post-closure water quality (i.e. to match the receiving environment or Environmental Values as defined in the Environmental Protection (Water) Policy 2009 has not been discussed. The potential to treat the water prior to supplementing the creek would need to be adequately conditioned.

The proposed mitigation measure will result in a residual risk for the operation of the abstraction bores and the maintenance of the required infrastructure.

Suggested Solutions, Recommendations and Conditions

Provide additional detailed information on how potential impacts on flow regimes (and recharge) are to be measured, monitored and conditioned.

Provide further detailed analysis of the alluvium and Styx Coal measure overburden groundwater levels as they relate to groundwater interactions.

Discussion on the post-closure water quality in relation to the Styx River, Shoalwater Creek and Water Park Creek Basins Environmental Values and Water Quality Objectives (DEHP 2014b) is required.

Detail the post-closure operation and maintenance of the abstraction bores and related supplementary water infrastructure.

Provide additional information on the suitability of supplementary watering by GDE type with reference to site characteristics and the expected life of groundwater drawdown impact.

Provide additional information on the feasibility of indirect application of supplementary water to Type 3 GDEs given site characteristics (e.g. steep incised stream banks). Describe the potential risks/impacts of site-specific direct application approaches.

The department identified significant uncertainties associated with the proposed project, including a seasonal understanding of water levels and quality. Remodelling would also be required to predict potential impacts of the groundwater drawdown.

Significant detailed information is still required to assess the environmental risks associated with dewatering and impact to receptors that would likely result from the mining activity.

Significant ongoing pre-disturbance monitoring and planning is required to manage the potential impacts to receptors in order to refine the proposed mitigation measure. Many of the mitigations

appear to be dependent on impacts as they arise either from the actual activity, or are to be derived from the additional monitoring data (i.e. information is inconclusive).

Based on the information provided, for the project to proceed, robust conditioning would be required to ensure that all potential impacts are adequately monitored and the receiving environment protected. Based on the length of time (as modelled) for the groundwater to recover, and the likely impacts to the receiving environment in the event that pools dry up, any approval should consider applying financial assurance for the entirety of the groundwater recovery timeframe.

Note: The department notes a responsible entity would need to manage the supplementary supply of water into the creek system for many years to come after mine closure.

Proponent Response

Additional information has been collected relating to surface and groundwater and their interactions since the SEIS v2, including:

- Surface and groundwater data, with a further 17 rounds of samples, plus additional surface water and tidal measurements, combined into one complete dataset, and subject to detailed data quality assessment prior to use (refer Sections 9.2.2 and 9.3.6 of Chapter 9 - Surface Water, and Sections 10.2.2, 10.3.6.3 and 10.3.6.6 of Chapter 10 - Groundwater)
- An assessment of pools and their persistence based on existing and additional survey of pools along both Deep and Tooloombah Creeks, review of satellite data and information from monitoring since 2011 (refer 9.3.4.5 of Chapter 9 - Surface Water and Section 10.3.7 of Chapter 10 - Groundwater)
- Significant on site drilling investigations within the alluvial corridor, to assist in improving understanding of likely water movement within sediments of the alluvial corridor in response to predicted groundwater drawdown arising from the Project (see in particular Section 10.3.7 of Chapter 10 - Groundwater)
- Transient Electromagnetic Survey (Appendix A6f) to delineate the areas of high and low transmissivity and low and higher salinity, allowing for the Quaternary Alluvium (Qa) to be differentiated from the Quaternary Pleistocene Alluvium (Qpa), which has a much lower permeability and transmissivity, and has also identified areas of bank storage at the time of the assessment (as opposed to water table storage).

Further to the above, assessment of surface and groundwater quality, trends and patterns has been undertaken on the complete dataset (Appendices A5a and A6c), and an assessment of stream flow and potential impacts based on modelled data, but using information from the stream flow gauges that have been installed since the last SEIS (v2) and have been recording flow since mid October 2019. From this, stream flow estimates have been determined for both creeks. Coupled with the results of a revised regional groundwater model (Appendix 6b) and new flood study and site water balance (Appendix 5b), as discussed in Section 9.6.2.1 of Chapter 9 – Surface Water, an assessment of changes to flow within the streams as a result of a reduction in baseflow found the impact to be negligible, and that there would be no impact on the number of days that flow occurs in the receiving watercourses.

This revised SEIS has assessed the potential for drawdown of groundwater to impact on GDEs, including an assessment of the extent, type and potential connectivity of GDEs in the Project area, completed by Eco Logical Australia (ELA) and included as a Technical Report to this SEIS v3 (Appendix

A10a), informed by the results of a new regional groundwater model (Appendix 6b) and the results of the new flood study and site water balance (Appendix 5b), and a study of interactions between surface waters and groundwater (Appendix 6d).

The above work along with an assessment of monitoring data and lithology and groundwater level of creek cross sections near to the Project has concluded that essentially, direct drawdown impacts on the pools within both Deep and Tooloombah Creeks is unlikely, with potentially some changes to the persistence of limited areas. Data for one of the existing pools along Tooloombah Creek indicates that the pool currently receives a small, saline inflow that is independent of rainfall. If the Project causes this inflow to cease, this pool may become ephemeral, drying out for about 5% of the time before being refilled by surface runoff. In that scenario, the water quality of the pool will likely become fresher due to the absence of a saline groundwater inflow. Given the increasing persistence moving downstream in Tooloombah Creek, there may be other pools similarly affected, however the available data indicates that pools upstream and downstream of this pool are not subject to the same saline inflow – it is the presence of outcropping Styx Coal Measures that appears to be the cause in this case. This is described in more detail in the response to the Queensland Department of Agriculture and Fisheries (DAF) Comment 1 (Section 3.6.1.1).

As such, Central Queensland Coal (CQC) has revised the Project description since submission of the SEIS v2 and is no longer proposing to supplement natural stream flows to support aquatic ecosystems and riparian vegetation. As such, no residual risk from this supplemental watering exists either during or after mining ceases.

The following addresses the suggestions provided by DES in relation to this comment:

3.6.2.1.1 Provide additional detailed information on how potential impacts on flow regimes (and recharge) are to be measured, monitored and conditioned.

Changes to flow regimes as a result of the Project are provided in Section 9.6.2.1 of Chapter 9 – Surface Water. Mitigation, management and monitoring measures are set out in Section 9.7 of Chapter 9 – Surface Water. Of particular note to flow regimes is that a Receiving Environment Monitoring Program (REMP) has been developed (contained in Appendix A10f). The Draft REMP has been developed in accordance with the 'Receiving Environment Monitoring Program guideline - For use with Environmental Relevant Activities under the Environmental Protection Act 1994' (DES 2014). It outlines:

- monitoring requirements for flow monitoring, water quality, sediment quality, macroinvertebrates, fish and mangrove distribution, for both fresh and estuarine / marine areas
- proposed receiving environment monitoring sites, and their timing and frequency
- parameters to be sampled
- field sampling procedures and laboratory analysis requirements, including quality assurance and quality control procedures and samples and
- data analysis, reporting and review.

Chapter 23 sets out the proposed Environmental Authority (EA) conditions for the Project.

3.6.2.1.2 Provide further detailed analysis of the alluvium and Styx Coal measure overburden groundwater levels as they relate to groundwater interactions.

Detailed analysis of the alluvium and Styx Coal Measures groundwater levels as they relate to groundwater interactions are provided in Sections 10.3.6.3 and 10.3.7 of Chapter 10 – Groundwater.

3.6.2.1.3 Discussion on the post-closure water quality in relation to the Styx River, Shoalwater Creek and Water Park Creek Basins Environmental Values and Water Quality Objectives (DEHP 2014) is required.

A number of assessments have been undertaken to consider the risks to downstream environments, including the Broad Sound Fish Habitat Area (FHA), from changes to water quality (see the Sediment Loads Assessment in Appendix A15b, and Aquatic and Marine Ecology, GDE and Great Barrier Reef (GBR) Impact Assessment in Appendix A10a). These assessments indicate that the risks to downstream environments from sediments and/or high concentrations of water quality parameters contained in controlled or uncontrolled releases from the mine are low. The sediment load assessment using average climatic conditions indicates that the Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This is primarily due to the water management and sediment and erosion control systems for the Project being designed such that sediment-laden water is captured and treated on site. Additionally, current land use practices (cattle grazing) will cease across a large area, both on the Project Site and within upstream areas, thereby also reducing existing sediment and nutrient loads to downstream waters. Based on this assessment the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%.

Post closure, offset areas will remain in place and final rehabilitation will return the land to a stable, self supporting and non-polluting landform. Cattle grazing will increase again but only to existing levels, and this will coincide with the proposed riparian revegetation program and offsets to provide for ongoing protection to downstream waterways. Groundwater is not anticipated to contain contaminants, and the nature of the waste rock stockpiles, along with the proposed design and mitigation controls in place (refer Chapter 8 – Waste Rock and Rejects, and the Mineral Waste Management Plan in Appendix C to the draft EMP [Appendix 12 to the SEIS v3]).

A specific comparison with the WQOs is provided in Section 9.3.6.1 of Chapter 9 - Surface Water, and potential impacts to water quality are described in Section 9.6.5. As noted above, post-closure water quality will not deteriorate compared to existing water quality due to the Project, and would be expected to be better (improved riparian zones, protected offset areas, etc.).

3.6.2.1.4 Detail the post-closure operation and maintenance of the abstraction bores and related supplementary water infrastructure.

No post-closure abstraction bores are required (water for rehabilitation works will be sourced from site dams, which will also be rehabilitated and closed unless required for post-mine use).

3.6.2.1.5 Provide additional information on the suitability of supplementary watering by GDE type with reference to site characteristics and the expected life of groundwater drawdown impact.

CQC has revised the Project description since submission of the SEIS v2 and is no longer proposing to supplement natural stream flows to support aquatic ecosystems and riparian vegetation.

3.6.2.1.6 Provide additional information on the feasibility of indirect application of supplementary water to Type 3 GDEs given site characteristics (e.g. steep incised stream banks). Describe the potential risks/impacts of site-specific direct application approaches.

CQC has revised the Project description since submission of the SEIS v2 and is no longer proposing to supplement natural stream flows to support aquatic ecosystems and riparian vegetation.

3.6.2.1.7 The department identified significant uncertainties associated with the proposed project, including a seasonal understanding of water levels and quality. Remodelling would also be required to predict potential impacts of the groundwater drawdown.

Seasonal understanding of water levels and quality is provided in Section 9.3.6.2 of Chapter 9 - Surface Water and the Surface Water Quality Technical Report in Appendix A5a, and in Sections 10.3.6.3 and 10.3.6.6 of Chapter 10 - Groundwater, and the Groundwater Quality Data Summary report in Appendix A6c.

The revised groundwater model is described in Chapter 10 - Groundwater, summarised in the Groundwater Model Report Summary in Appendix A6a and included in the Groundwater Model and Assessment Report in Appendix A6b

3.6.2.1.8 Significant detailed information is still required to assess the environmental risks associated with dewatering and impact to receptors that would likely result from the mining activity.

Detailed information relating to the impacts of drawdown are described above, including more detail on drawdown impacts to surface water pools described in the response to the Queensland DAF Comment 1 (Section 3.6.1.3), and in Section 10.5, particularly Sections 10.5.1 and 10.5.4 of Chapter 10 - Groundwater.

3.6.2.1.9 Significant ongoing pre-disturbance monitoring and planning is required to manage the potential impacts to receptors in order to refine the proposed mitigation measure. Many of the mitigations appear to be dependent on impacts as they arise either from the actual activity, or are to be derived from the additional monitoring data (i.e. information is inconclusive).

Significant pre-disturbance data has been collected, and monitoring is proposed to continue to fill some identified gaps (although it should be noted that for many sites the existing data is more than sufficient).

Trigger Action Response Plans (TARPs) will outline actions and responses necessary should monitoring identify exceedances in the Project water quality criteria (trigger levels). In addition, the TARP will outline the criteria, monitoring and reporting measures for environmental incidents, unplanned events or cases of unauthorised discharge. Draft TARPs have been included in the Draft Water Management Plan (Appendix A5c) and in the sub plans in Appendix C to the Draft Environmental Management Plan (SEIS Appendix 12). These will be finalised once EA conditions are finalised and will be incorporated into the overall site monitoring program, including the Water Management Plan and REMP.

The incident reporting processes to DES will be completed as per the EA conditions.

3.6.2.1.10 Based on the information provided, for the project to proceed, robust conditioning would be required to ensure that all potential impacts are adequately monitored and the receiving environment protected. Based on the length of time (as modelled) for the groundwater to recover, and the likely impacts to the receiving environment in the event that pools dry up, any approval should consider applying financial assurance for the entirety of the groundwater recovery timeframe.

Noted. Financial assurance will be as required under the EA.

3.6.2.1.11 Note: The department notes a responsible entity would need to manage the supplementary supply of water into the creek system for many years to come after mine closure.

As described above, no supplementary supply of water to the environment is required or proposed.

3.6.2.2 Comment 2

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Chapter 9, Surface water. Section 9.9.2
Submitters Reference (if provided)	Comment 2; Table 1; 32.35		

Details of the Submission

Section 9.9 does not include information on the concentration of contaminants expected in the Mine Affected Water (MAW). However, in chapter 8 (section 8.9) the results of leachate samples were compared with triggers for the protection of aquatic ecosystems, irrigation and livestock. Indicators with results higher than the triggers are shown in Table 8-12. This information should be included or referenced in the surface water chapter (section 9.9).

The water release strategy has not adequately addressed MAW quality relating to the concentration of contaminants.

Suggested Solutions, Recommendations and Conditions

Include detailed information on the concentration of contaminants expected in the MAW. Relevant information in Chapter 8, Section 8.9 and Table 8-12 should be updated and referenced in the surface water Chapter 9, Section 9.9.

Proponent Response

Results from the Geochemical Assessment in Appendix A3b, summarised in Section 8.5 (and particularly Section 8.5.7) of Chapter 8 – Waste Rock and Rejects, concluded that leachate from bulk mine waste materials exposed to oxidising conditions would have a pH in the range 8.5 to 9.5; a low to moderate salinity; very low acidity (with net positive alkalinity); be dominated by sodium, chloride and sulfate ions, with very low calcium, magnesium and potassium; low sulfate (compared to ANZG default guideline values); and low metal / metalloid concentrations, with the exception of aluminium, arsenic, molybdenum and selenium, and to a lesser extent zinc and vanadium, in some of the samples.

A detailed assessment of water quality impacts to surface waters from the Project is provided in Section 9.6.5 of Chapter 9 – Surface Water. This includes the projected Dam 1 water quality (for salinity, sulfate, and four representative metals – arsenic, molybdenum, selenium and vanadium).

The input data for the water quality assessment (including concentrations) are provided in Table 8.4 in the Flood Study and Water Balance report in Appendix A5b.

Sediment export is discussed in Section 9.6.6 of Chapter 9 – Surface Water. The proposed release quality is provided in Sections 9.4.5 and 9.4.6.

The above salinity, sulfate and metals were based on the data from the geochemical assessment, and the sources and movement of these elements were tracked in the model throughout the water management system, up to release. As such, the predicted Dam 1 water quality and release water quality, being based on the available data and the way the water management system is proposed to operate, is representative of the expected water quality of releases.

3.6.2.3 Comment 3

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Chapter 9, Section 9.10.2
Submitters Reference (if provided)	Comment 3; Table 1; 32.39		

Details of the Submission

Sediment and erosion matters are not adequately assessed in the amended EIS. Section 9.10.2 discussed potential increases in water velocities for sections of the stream downstream of the mine site. The EIS should adequately assess the potential increased risk of stream bed and bank erosion, and the potential impacts to aquatic fauna as a consequence of bed mobilisation. The sediment loads exported to the Great Barrier Reef World Heritage Area (GBRWHA) should be assessed and effectively managed and suitable monitoring proposed.

Chapter 9 does not describe potential impacts to water quality and aquatic ecosystem health from the potential increased risk of stream bed and bank erosion.

Suggested Solutions, Recommendations and Conditions

Provide load estimation analysis, particularly as it relates to potential downstream impacts.

Provide a comprehensive Draft Receiving Environmental Monitoring Program (REMP) in the amended EIS. The REMP must include a monitoring program for sediment load and particle size distribution to assess the potential impacts from stream bed/bank erosion and sediment mobilisation. Findings from sediment monitoring must be considered in the Water Management Plan and Erosion and Sediment Control Plan (ESCP) annual revision.

The REMP must be consistent with the department's Receiving environment monitoring program guideline (ESR/2016/2399).

Provide a detailed Draft ESCP developed by an appropriately qualified person (Certified Professional in Erosion and Sediment Control and Registered Professional Engineer of Queensland) in the amended EIS.

The ESCP must:

1. demonstrate how ESC control measures adequately minimise the release of sediment to receiving waters and must include at least the following:
    a. assessment of all catchment areas
    b. assessment of soil types, including sodic dispersive soils

c. specify design criteria for ESC structures.

2. detail the locations and descriptions of all ESC measures

3. provide an audit schedule to ensure ESC controls are being maintained.

Proponent Response

A detailed Draft ESCP has been prepared for the Project (see Appendix A15a) which identifies the measures to be implemented to control erosion and sediment runoff from the site. The plan was prepared and has been certified by a Certified Professional in Erosion and Sediment Control (CPESC), and includes an inspection checklist and Typical Standard Installation Details. This will be updated prior to works commencing and throughout the Project life as needed, to ensure it remains up to date at all times. Installation details are provided in Appendix C to the plan, with the strategy described within the report. Detailed placement will be determined during detailed design, and re-certified by a CPESC with the finalisation of the plan (prior to works commencing).

The Draft ESCP was prepared based on soil information summarised in Chapter 5 – Land (refer Sections 5.3.4.2 and 5.3.4.4) and detailed in the Land Suitability Assessment in Appendix A3a.

A detailed Sediment Loads Assessment has also been conducted, provided in Appendix A15b. The assessment finds the Project will result in a positive contribution to the sediment load targets in the Reef 2050 Plan through the expected reduction in sediment load reporting to Tooloombah Creek and Deep Creek associated with the cessation of grazing activities and subsequent managed regeneration of native vegetation on the majority of the Mamelon property. At least 95% of sediments up to 0.045 mm diameter would be captured and retained within the site under typical flow conditions through rapid settlement of coarse-grained particles during all storm events and settlement of fine-grained particles under controlled conditions. Existing sediment discharges to the GBR will be reduced by approximately 50% under average climatic conditions (which equates to 2,740 tonnes of sediment per year retained on site) as a result of the Project and associated sediment and land management practices. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%. The assessment also considered non-average, very wet, climatic conditions when sediment might be expected to mobilise more readily and found that, even under non-average wet and very wet conditions, the sediment load from the Project will be less than that of current baseline conditions.

A detailed geomorphological study of the Project (Appendix A5d) identified some localised areas where modelled velocity and bed shear stress values were such that specific mitigation and/or monitoring actions were recommended. However, the study found the overall risk of rapid and significant geomorphic change due to the proposed mining activity was negligible.

A draft REMP has also been prepared which presents a plan to monitor, identify and describe any adverse impacts to environmental values of the receiving environment as a result of controlled or uncontrolled water releases to the environment. The monitoring program outlined in the REMP has been developed to ensure that best practice environmental management is applied to maintain the ecological processes and environmental values associated with the receiving environment located within and adjacent to the Project Area. In addition to identifying baseline conditions, the data collected through the REMP will enable potential impacts to be detected and will drive continual improvement in management of the mine construction and operations.

The REMP has been developed to be consistent with the DES (2014) ‘Receiving environment monitoring program guideline’ (ESR/2016/2399).

Regarding impacts to aquatic ecological receptors, including the Styx River Estuary, Broad Sound and the GBR, CQC commissioned ELA to complete a revised assessment of Project impacts on aquatic ecology, marine ecology and the GBR. There are no expected impacts as a result of the Project to any aquatic ecosystem, including the GBR.

3.6.2.4 Comment 4

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.6.4, Chapter 10, page 10-51, Potential impacts to groundwater quality
Submitters Reference (if provided)	Comment 4; Table 1; 32.54		

Details of the Submission

As noted in previous rounds of comments, the potential for contaminants to exceed toxicant trigger values was discussed in section 10.7.2.3 where it was stated that "there is the potential for some metals/metalloids (such as As, Mo, Se and V) to be elevated above aquatic ecosystem criteria (e.g. ANZECC 2000), although many metals / metalloids do naturally occur above these criteria (see Section 10.5.6.5)".

In section 10.8.4.4 it was stated that "groundwater quality performance triggers will be based on statistical analysis of the reported ranges in baseline concentrations of identified analytes of concern (e.g. pH, salinity concentrations, and concentrations of dissolved metals such as As, Al, Mo, Se and V)." This provides some information of the metals that would be monitored.

Suggested Solutions, Recommendations and Conditions

The EIS provides some additional information in Table 10-80 describing effects, exposure and threat assessment. Update the revised EIS to ensure this information clearly describes all potential contaminants of concern, potential sources of contaminants and linkages to proposed monitoring and licencing approaches.

The department notes a recent information guideline explanatory note – "Deriving site-specific guideline values for physico-chemical parameters and toxicants" available from the IESC website at http://www.iesc.environment.gov.au/publications/information-guidelines-explanatory-note-deriving-site-specific-guidelines-values

Proponent Response

Results from the Geochemical Assessment in Appendix A3b, commissioned for this SEIS v3 and summarised in Section 8.5 (and particularly Section 8.5.7) of Chapter 8 – Waste Rock and Rejects, concluded that leachate from bulk mine waste materials exposed to oxidising conditions would have a pH in the range 8.5 to 9.5; a low to moderate salinity; very low acidity (with net positive alkalinity); be dominated by sodium, chloride and sulfate ions, with very low calcium, magnesium and potassium; low sulfate (compared to ANZG default guideline values); and low metal / metalloid concentrations, with the exception of aluminium, arsenic, molybdenum and selenium, and to a lesser extent zinc and vanadium, in some of the samples.

A detailed assessment of water quality impacts to surface waters from the Project is provided in Section 9.6.5 of Chapter 9 – Surface Water. This includes projected Dam 1 water quality (for salinity, sulfate, and four representative metals – arsenic, molybdenum, selenium and vanadium). The input

data for the water quality assessment (including concentrations) are provided in Table 8.4 in the Flood Study and Water Balance report in Appendix A5b.

Section 9.4.6 of Chapter 9 – Surface Water and the draft Receiving Environment Monitoring Program (REMP) in Appendix A10f both clearly identify the parameters to be monitored, as well as the proposed trigger values. These have been derived based on the ANZG (2018) and QWQG approach, as specified within the Surface Water Quality Technical Report in Appendix A5a. This approach complies with that recommended in the IESC guideline 'Deriving site-specific guideline values for physico-chemical parameters and toxicants'.

3.6.2.5 Comment 5

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.6.5, Chapter 10, page 10-52, Potential impacts to groundwater – surface water interaction
Submitters Reference (if provided)	Comment 5; Table 1; 32.55		

Details of the Submission

The Tables referenced as providing this information (i.e. Tables 10-79 – 10-82) did not directly address the issue raised. There was discussion of the effect of drawdown on GDEs in these tables, however, it was not clear whether modelled predictions of groundwater account for potential change in topography and recharge.

Suggested Solutions, Recommendations and Conditions

Amend the EIS to assess whether expected changes in topography would influence aquifer recharge.

Proponent Response

The revised numerical groundwater model has taken into account changes in topography on the drawdown and recharge mechanisms and effects. In particular, the model incorporates the effect of elevated landforms on recharge mechanisms. The construction of the model is summarised in Section 10.2.4 of Chapter 10 – Groundwater, and the effects of mounding under these landforms post-mining is discussed in Section 10.5.1.2.1.

The results predict a slight mounding under the elevated landforms, and as a consequence, once groundwater levels reach equilibrium, a small increase in baseflow reporting to creeks (predicted at 0.4 L/s per km for Tooloombah Creek, and in the order of 0.07 L/s per km for Deep Creek). Any enhanced baseflow to creeks would result in increased permanence of some pools, and the mounding of groundwater due to enhanced infiltration under these landforms would be expected to result in this baseflow being fresher than the deeper more saline groundwaters, and so may also result in lower salinity levels in these pools. However, this is based on the conservative assumption of connectivity throughout the alluvium, which, as described in above comments (e.g. Comment 1 in Section 3.6.1.1), may not always be the case.

3.6.2.6 Comment 6

TOR Category or EIS Chapter	Groundwater; Aquatic Ecology; Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Chapter 10, Section 10.6.5, p.10-52
Submitters Reference (if provided)	Comment 6; Table 1; 32.56		

Details of the Submission

Monitoring and management strategy/plan for GDE's (including Type 3 GDEs) has been included in the draft conditions, as well as water level monitoring and limits.

Suggested Solutions, Recommendations and Conditions

Demonstrate that the long-term modelling of the impacts and mitigation measures for GDEs will be undertaken during all stages of the mining operations and for a minimum of 100 years post mining.

GDEs must be protected from environmental harm caused directly or indirectly from mining activities. The department considers that the monitoring and mitigation measures proposed for GDEs should not be incorporated within a REMP as proposed. The department recommends that a specific management plan to manage impacts to GDEs is drafted to an advanced level, commensurate with the identified environmental risks, for assessment.

A detailed draft Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP) must be developed and certified by an appropriately qualified person that addresses all phases of the mining operation. The GDEMMP must meet the following objectives:

- Validation of groundwater numerical model (including review of boundary and recharge conditions) to refine and confirm accuracy of groundwater impacts predicted
- Groundwater level monitoring in all identified geological units present across and adjacent to the mine site to confirm existing groundwater flow patterns and monitor drawdown impacts
- Identification of groundwater drawdown level thresholds for monitoring the impacts on GDEs
- Monitoring of aquifers identified as potentially being impacted from groundwater drawdown
- Identify and refine potential impacts of groundwater levels
- To ensure all potential groundwater impacts from mine dewatering and mine water and waste storage facilities are identified, mitigated and monitored.

A draft GDEMMP must be submitted for assessment by the department in the amended EIS.

Proponent Response

A draft GDEMMP has been prepared for the Project and is provided in Appendix 10e. The preparation of the GDEMMP is based on the additional assessments undertaken for SEIS v3 including completion of a new regional groundwater model (see Appendix 6a and 6b), surface water modelling (see Appendix 5b), an assessment of groundwater and surface water interactions (see Appendix 6d), GDE investigations (See Appendix 10d), transient electromagnetic (TEM) survey (See Appendix 6f), fluvial geomorphology study (see Appendix 5d), analysis of surface water and groundwater data, including groundwater quality and water level data from several bores and stream flow data collected from gauges installed at Tooloombah and Deep Creek in 2019 (See Appendix 5a and 6c), geological coring of the soil profile and observational pools surveys.

The purpose of the GDEMMP is to minimise and manage the environmental impacts of the Project on GDEs through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and post operations. The objectives of the GDEMMP are as follows:

- Present the assessed impacts and threats to groundwater and ecological attributes for each of the GDEs.
- Detail the ecological and groundwater values that have been monitored during baseline phases of the Project.
- Identify management goals and triggers for each GDE, which will be refined over time as further information becomes available during the pre-impact and impact phases of the Project.
- Provide details of a monitoring program for both pre-impact and impact phases of the Project, including how this monitoring will build on existing baseline information, and inform the implementation of relevant mitigation, management and offset measures.
- Describe mitigation and management measures with specific criteria, timing, performance objectives, goals and corrective actions.
- Provide sufficient information on the intended management of GDEs to allow the Queensland and Commonwealth governments to make an assessment of the Project under relevant legislation.

The GDEMMP includes monitoring of groundwater quality and level at key GDE locations, ongoing validation and recalibration of the groundwater model, identification of management measures, triggers and corrective actions for each GDE, and a process of adaptive management where the results of monitoring inform the ongoing implementation of management measures.

It is expected that the Draft GDEMMP will be further refined in the post-EIS phase of the Project in response to feedback from the Department, before being finalised and certified by a suitably qualified person for implementation. The GDEMMP will be subject to annual reviews and independent peer review of the results during implementation.

3.6.2.6.1 The GDEMMP must meet the following objective: Validation of groundwater numerical model (including review of boundary and recharge conditions) to refine and confirm accuracy of groundwater impacts predicted

As outlined in the GDEMMP there is interaction among the Project management plans during all phases of the Project, with the results of monitoring in some plans informing the implementation of management and corrective actions in other plans. For example, the monitoring results from the Groundwater Management and Monitoring Plan (GMMP), developed as part of the Project EMP, will be utilised in the implementation and refinement of the GDEMMP.

The GMMP is based on the recommendations arising from the regional groundwater model and will involve regular monitoring of bores within the various groundwater layers. A subset of bores that will be monitored as part of the EMP are of particular interest to GDEs, comprising those that are located within the water table aquifer and in close proximity to GDEs.

The GMMP will collect data to facilitate future validation of the numerical groundwater model and any exchange of water between groundwater layers. As outlined in the GMMP, the numerical groundwater model will be reviewed prior to mining commencing on-site, and every three years

from commencement of mining. Additional data collected will be utilised to validate the model and any required revisions or updates will be made accordingly.

3.6.2.6.2 The GDEMMP must meet the following objective: Groundwater level monitoring in all identified geological units present across and adjacent to the mine site to confirm existing groundwater flow patterns and monitor drawdown impacts

The GMMP provides the groundwater monitoring program for the Project and as described above the GDEMMP will utilise data collected through this program in the implementation and refinement of the GDEMMP.

Water level and pressure data is described in the GMMP. Water level data will be collected on a quarterly basis at the sites shown in Figure 3-7: Groundwater monitoring sites. These monitoring sites have been located such that groundwater level data is collected in all identified hydrostratigraphic units across the Project Area. The results of these monitoring measures are relevant to each type of GDE, with groundwater level at nearby bores providing an early indication of draw down potentially affecting the adjacent ecological values.

3.6.2.6.3 The GDEMMP must meet the following objective: Identification of groundwater drawdown level thresholds for monitoring the impacts on GDEs

The GDEMMP identifies groundwater drawdown level triggers as provided in Table 3-5. These triggers are relevant for all GDE types along the riparian corridors and Wetland 1. The triggers relate to alluvial groundwater bores, which are located in close proximity to GDEs and provide insight into how the groundwater resources of GDEs may be affected by the Project.

Table 3-5: Groundwater drawdown level thresholds for GDEs

Bore	3 year predicted drawdown (m)	Maximum predicted drawdown (m)	Relative Drawdown trigger (m)	Relevant ecological receptor
Tooloombah Creek				
WMP06	0.6	0.9	2.0	Subterranean, Aquatic and Terrestrial GDEs
WMP04	9.8	19.9	7.0	
WMP02	0.5	1.1	2.0	
WMP28	3.7	4.6	2.0	
WMP12	0.6	2.5	2.0	
Deep Creek				
WMP05	<0.5	1.6	2.0	Subterranean, Aquatic and Terrestrial GDEs
WMP21	0.9	11.7	2.0	
WMP10	<0.5	44.8	8.7	
WMP09	<0.5	3.8	2.9	
WMP08	<0.5	<0.5	2.0	
Wetland 1				
WMP25	<0.5	2.7	2.0	Terrestrial GDE
Styx River				
WMP29A	<0.5	<0.5	2.0	Control site where drawdown is not predicted
WMP29B	<0.5	<0.5	2.0	Control site where drawdown is not predicted

3.6.2.6.4 The GDEMMP must meet the following objective: Monitoring of aquifers identified as potentially being impacted from groundwater drawdown

The GMMP provides the groundwater monitoring program for the Project, and as described above the GDEMMP will utilise data collected through this program in the implementation and refinement of the GDEMMP. Monitoring will be undertaken to assess water quality, water level/pressure and seepage as detailed in the GMMP. Groundwater monitoring will be undertaken in all aquifers identified as potentially being impacted from groundwater drawdown.

3.6.2.6.5 The GDEMMP must meet the following objective: Identify and refine potential impacts of groundwater levels

As outlined above, the GMMP includes processes to monitor groundwater levels on a quarterly basis. This data will be used to validate the numerical groundwater model and any required revisions or updates will be made accordingly. Validation of the model will occur prior to the commencement of mining and every three years from the commencement of mining.

Utilising data collected through the GMMP and the results of the model validation process, the GDEMMP will monitor actual vegetation impacts in comparison with those predicted (165 ha considered worst case) and also assess areas located on the fringe of the assessed impact area, and in areas not subject to groundwater drawdown. Triggers for adaptive management and corrective actions are specified in the GDEMMP. This includes triggers for changes in groundwater levels.

If a trigger is exceeded, an investigation will be conducted to determine whether the detected result is a direct result of mining activities, and consistent with what has been approved, as outlined in the SEIS v3 and relevant approval conditions. The investigation will follow the broad approach outlined in Section 3.3 of the ANZECC (2000) Guidelines, and will involve:

- Development of a decision tree model for the possible effect of mining activities on the measured variable.
- Site-specific investigations involving the collection and interpretation of additional data.
- A review of relevant data related to potential non-mining causes of variability in environmental variables (e.g. climatic data).
- Development of a detailed model of relevant environmental variables.
- Expert opinion on the potential for environmental harm.

Where triggers are exceeded, corrective actions are outlined in the GDEMMP and will be implemented as required. For example, if groundwater level thresholds are exceeded the appropriate corrective actions will be implemented and may include:

- Immediately limiting mining activities to current activities, until monitoring indicates the trigger level(s) are no longer being exceeded, or at further risk of being exceeded.
- If the investigation indicates that there is a risk of impacts to Terrestrial GDEs beyond that approved, monitoring will be reviewed and a report prepared within 3 months to identify the actual impact from the mining activities.
- If the investigation finds that the actual areas of impact to Terrestrial GDEs differ from the area of impact as detailed in the Biodiversity Offset Strategy, the Biodiversity Offset Strategy will be amended within 30 days and the amended offset delivered within 12 months.

3.6.2.6.6 The GDEMMP must meet the following objective: To ensure all potential groundwater impacts from mine dewatering and mine water and waste storage facilities are identified, mitigated and monitored.

The GDEMMP, in co-ordination with the GMMP, will ensure that all potential groundwater impacts from mine dewatering and mine water and waste storage facilities are identified, mitigated and monitored. The impacts of the Project on GDEs is assessed in the SEIS v3 and in Section 5.2 of the GDEMMP. Section 5.3 of the GDEMMP outlines the mitigation and management measures to address the identified impacts, and 5.4 outlines the monitoring program for GDEs over the life of the Project.

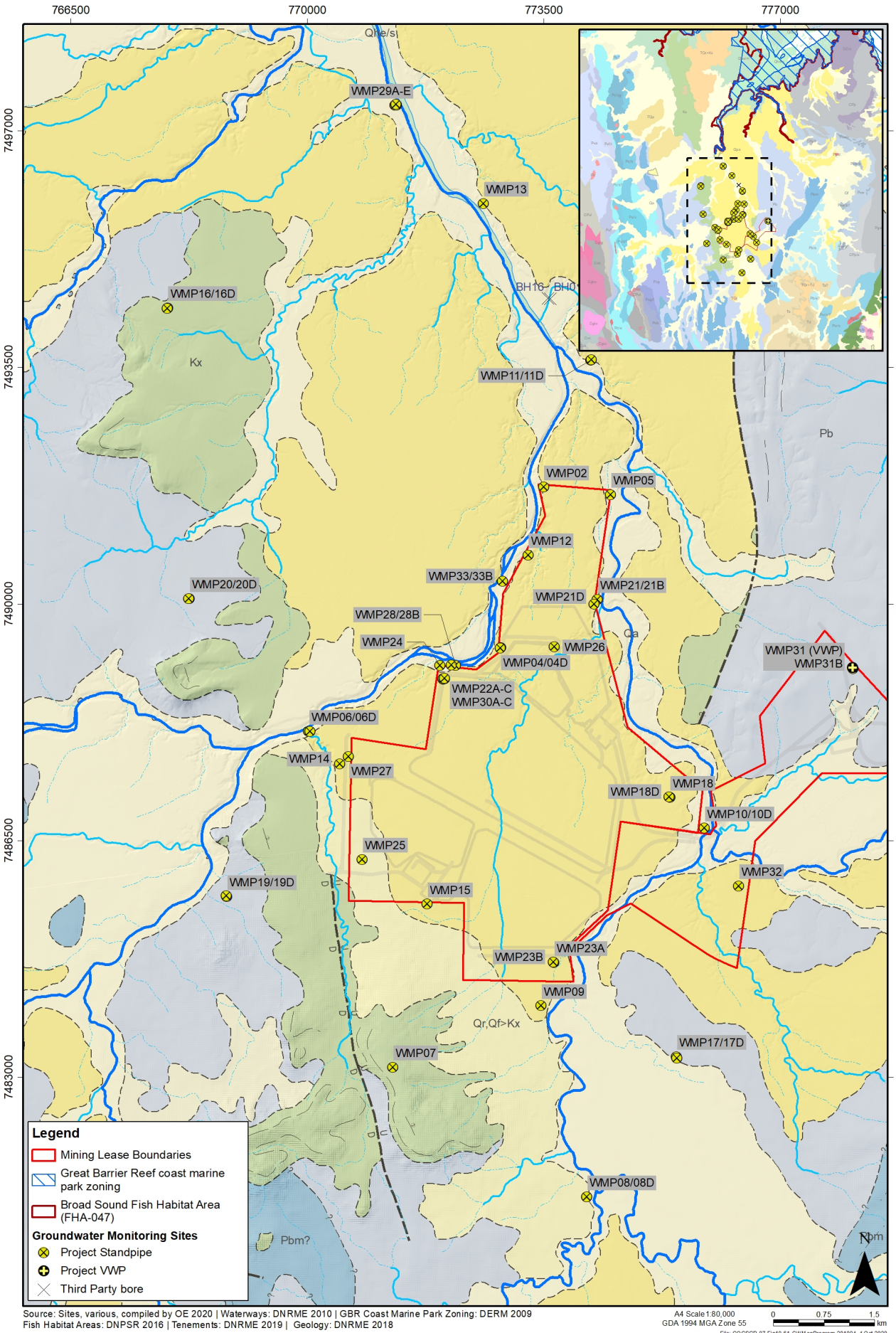


Figure 3-7: Groundwater monitoring sites

3.6.2.7 Comment 7

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.8.4, Chapter 10, page 10-72, Groundwater Monitoring and Evaluation Program
Submitters Reference (if provided)	Comment 7; Table 1; 32.57		

Details of the Submission

A list of indicators that would be measured including dissolved metals (including aluminium, arsenic, selenium and vanadium) and hydrocarbons (TPH, TRH and BTEXN) is described in section 10.8.5 (Groundwater and GDE Monitoring).

The monitoring frequency proposed is six monthly. Where a trigger is exceeded, it was proposed that sampling frequency may increase from six monthly to quarterly or more frequently, and additional monitoring locations may be incorporated.

Suggested Solutions, Recommendations and Conditions

The monitoring approach proposed in the amended EIS is not supported. Monitoring should be quarterly in the first instance and where it can be demonstrated that there is a need to reduce monitoring that a process of review be undertaken prior to reducing sampling frequency.

Proponent Response

The monitoring program is summarised in Section 10.6.5 of Chapter 10 – Groundwater. It includes water quality, level, tidal measurements and seepage monitoring. Groundwater monitoring is proposed to be quarterly.

3.6.2.8 Comment 8

TOR Category or EIS Chapter	Land; Surface Water; Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.3.3.2 Chapter 11 “Key rehabilitation considerations” Pages 11
Submitters Reference (if provided)	Comment 8; Table 1; 32.59		

Details of the Submission

The department’s previous comments have not been adequately addressed. Section 11.3.3.2 does not detail the post closure flooding impacts of diversions and does not adequately describe how diversions would be constructed to be safe, stable and non-polluting during operation and closure, apart from stating that they will be. Furthermore, the word “safe” is not used in the key considerations.

Suggested Solutions, Recommendations and Conditions

Describe post closure flooding impacts of diversions.

Discuss how diversions would be constructed to be safe, stable and non- polluting during operation and closure.

Assess the potential impacts of the diversion on the floodplain.

Proponent Response

No diversions of major water courses are proposed for the Project. The Project includes construction of two catchment diversion drains to divert local catchments to Deep Creek. Detailed flood impact and geomorphological assessments have been undertaken to confirm that these drains will not have significant impacts on flooding or erosion (see Sections 9.6.1 and 9.6.4 of Chapter 9 – Surface Water, and the technical reports – Appendix A5b - Flood Study and Water Balance, Appendix A5d - Fluvial Geomorphology).

Preliminary design of the diversion drains has been undertaken. The design is based on relatively flat bed gradients that ensure non-erosive flow velocities within the drains. Further detailed design of the drains will be undertaken as part of the Project infrastructure design. This will include suitable erosion and sediment control measures for earthworks batters to control potential erosion of the batters by local runoff.

The Northern Catchment Diversion Drain is a temporary structure. The upper portion of the drain will be mined through after Year 11 of the Project. The downstream portion of the drain will be rehabilitated after this time because the drain is no longer required. The Southern Catchment Diversion Drain will remain as a permanent structure to divert local stormwater runoff around the backfilled Open Cut 1. This drain has a much smaller catchment area than the Northern Catchment Diversion Drain.

The proposed final landform is based on generally reinstating pre-mine surface levels across the backfilled open cut pits. Excess overburden material will be rehabilitated in two emplacements, one on either side of the Bruce Highway, located outside the main channel flood extent of Tooloombah and Deep creeks. The backfilled mining pit will include realigned drainage paths to drain local runoff, as well as any flow breakouts from Deep Creek, to Tooloombah and Deep creeks. Indicative alignments for the realigned drainage paths are shown in Figure 5-4 of the Flood Study and Water Balance in Appendix A5b. Detailed design of the reinstated drainage paths across the backfilled mining pit will be undertaken to ensure that the final landform will be safe, stable and non-polluting in the long term, with flows conveyed at non-erosive velocities. Detailed design will be integrated with rehabilitation planning and will include consideration of soil resources, vegetation and hydraulic characteristics. The design approach will reference hydraulic conditions along undisturbed local drainage paths as a template for design of stable flow paths on the rehabilitated site.

Decommissioning and rehabilitation objectives for the mine, including the diversions, are set in Chapter 11 – Rehabilitation and Decommissioning. The overarching objectives are to:

- providing final landforms with similar land use capabilities and / or suitability as those which existed prior to the disturbance, unless other beneficial land uses are pre-determined and agreed with key stakeholders throughout the mining operations (post-mining land owners, managers and relevant regulators)
- rehabilitation of disturbed land as soon as practicably available so that it presents a negligible safety or environmental risk in terms of stability
- providing land that is self-sustaining to agriculture and/or ecosystem processes where maintenance requirements are negligible and consistent with an agreed post-mining land use and
- maintaining the water quality and quantity acceptable for existing and future users within or surrounding the site.

3.6.2.9 Comment 9

TOR Category or EIS Chapter	Land; Surface Water; Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.13, Ch. 11 Table 11-15 - reference to diversions
Submitters Reference (if provided)	Comment 9; Table 1; 32.59		

Details of the Submission

It is not clear in the EIS whether the diversions are the same drainage diversions referred to in Section 11.3.3.2.

Suggested Solutions, Recommendations and Conditions

Clarify whether the diversions described in Table 11-15, under the Waste rock stockpile and Water infrastructure domains are the same drainage diversions which are described in Section 11.3.3.2.

Proponent Response

The updated drainage concept for the Project includes the construction of two catchment diversion drains to divert local catchments to Deep Creek. Detailed flood impact and geomorphological assessments have been undertaken to confirm that these drains will not have significant impacts on flooding or erosion. No diversions of major water courses are proposed. See Section 9.4 of Chapter 9 – Surface Water and Appendix 5b – Flood Study and Water Balance for the details of the revised mine site water management system.

3.6.2.10 Comment 10

TOR Category or EIS Chapter	Land; Groundwater; Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Chapter 11, Section 11.3.3.2, p.11-11
Submitters Reference (if provided)	Comment 10; Table 1; 32.60		

Details of the Submission

Based on the conflicting/ambiguous information presented in different sections of the EIS – it is unclear as to whether dams associated with the waste rock stockpiles would be retained or removed.

The EIS outlined an expectation that there is limited potential for acid drainage from the waste rock stockpiles. This commitment must be included in the completion criteria.

Suggested Solutions, Recommendations and Conditions

In the event that dams associated with the waste rock stockpiles are retained – a clear statement is required to outline any residual risk or associated ongoing management.

Completion criteria / indicators must clearly identify and measure that the final rehabilitated landform is not producing acid or saline drainage. Completion criteria are set to achieve a non-polluting objective, the following criteria should be added – 'runoff and seepage will be good quality water that is unlikely to adversely impact known environmental values'.

Proponent Response

Dams associated with waste rock stockpiles are not proposed to be retained.

Post closure, it is proposed to remove all catchment diversion drains and dams, fill all voids, flatten slopes to a maximum 7 degree overall grade and rehabilitate and stabilise all previously disturbed areas to achieve a post mining land use that is stable, vegetated and self-sustaining and supports the intended final land use.

Completion criteria have been set to ensure the final landform will not produce acid or saline drainage. The stability of the waste rock stockpiles will be monitored and reassessed as required based on the nature of foundation materials, fill materials, and capping materials. The reassessments will consider short-term, long-term and extreme conditions and be implemented in accordance with the requirements of the 'Assessment and Management of Acid Drainage guideline of the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland' series (DME 1995).

The decommissioning and rehabilitation objectives, indicators and completion criteria for each mine domain are detailed in Table 11-6 of Chapter 11 – Rehabilitation and Decommissioning. The following completion criteria has been included for each domain:

- Runoff and seepage from rehabilitated landform will be of a quality which is unlikely to adversely impact known environmental values.

3.6.2.11 Comment 11

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Section 14.1 Chapter 14 "Figure 1, Flora Survey Locations" Pages: 14
Submitters Reference (if provided)	Comment 11; Table 1; 32.83		

Details of the Submission

The recommendation on the last submission requested that the amended EIS provide further justification on the adequacy of the extent and location of flora surveys, noting that in "Figure 14-1" they seem inadequate. It appears that a different "Figure 14-1" has been inserted in the revised chapter which has the same survey locations overlaying vegetation that has been categorised in a different way. Further explanation of why these site locations are adequate has not been provided.

Suggested Solutions, Recommendations and Conditions

Provide a justification that the location and extent of the survey sites is adequate in areas mapped as "of concern" remnant vegetation. Additionally replace "Figure 1" with the amended map (Appendix 19) which classifies where the "of concern" remnant vegetation is, alongside the endangered and least concern vegetation.

Proponent Response

Vegetation and flora surveys have been undertaken from 2011 to 2020 in order to ground truth the regional ecosystems (RE) within the Project Site and Near Surrounds. A summary of all survey events is provided in Table 14-2 of Chapter 14 – Terrestrial Ecology and is replicated in Table 3-6 below. Survey site locations are shown on Figure 14-1 in Chapter 14 – Terrestrial Ecology.

Within the Of Concern remnant vegetation of the entire the Study Area (EPC 1029) a total of 79 BioCondition assessments, 12 tertiary, 5 secondary and 27 quaternary assessments have been undertaken.

Within the Of Concern remnant vegetation within the Disturbance Area (112.2 ha), a total of 11 BioCondition assessments, 1 tertiary and 4 quaternary assessments have been undertaken.

Depending on their timing, surveys have been undertaken in accordance with either Neldner et al. (2005), Neldner et al. (2017) or Neldner et al. (2019), or Eyre (2015). Based on the survey events undertaken, Figure 14-6 shows the extent of ground-truthed RE within the Project Site and Near Surrounds, as well as the source of the data, and Figure 14-7 shows the ground-truthed RE present. These figures are replicated in Figure 3-8 and Figure 3-9 below.

CQC submitted a vegetation map amendment request to DES in 2018 based on mapping undertaken by 3D Environmental in 2018. CQC has been advised by DES that the Queensland Herbarium accepted the majority of changes to the RE mapping as presented in the request. The only change that was not accepted was the inclusion of a small patch of RE 11.4.9 (0.5 ha). Due to its size, it is too small to map. CQC understands that Version 12 of the RE mapping containing the updates that relate to the map amendment request is due for release in December 2020.

The RE mapping presented in SEIS v3 is consistent with the mapping submitted to, and approved by the Queensland Herbarium in 2018, with the exception that the mapping presented in SEIS v3 still includes the small patch of RE 11.4.9 (0.5 ha) (i.e. this has not been removed of the purpose of this assessment). As such, the location and extent of the survey sites is considered adequate in areas mapped as “of concern” remnant vegetation.

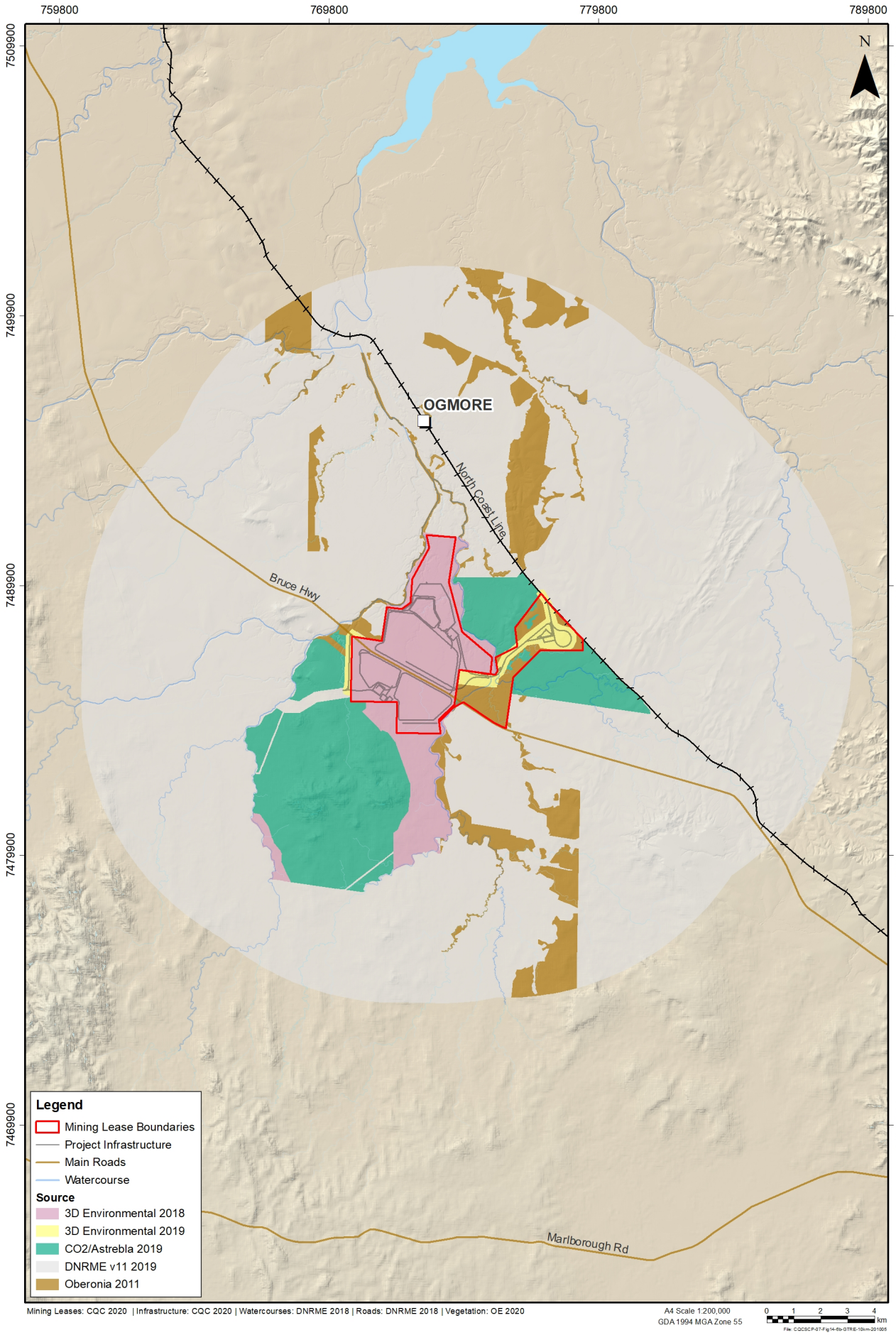


Figure 3-8: Extent of ground-truthed regional ecosystems and source of data

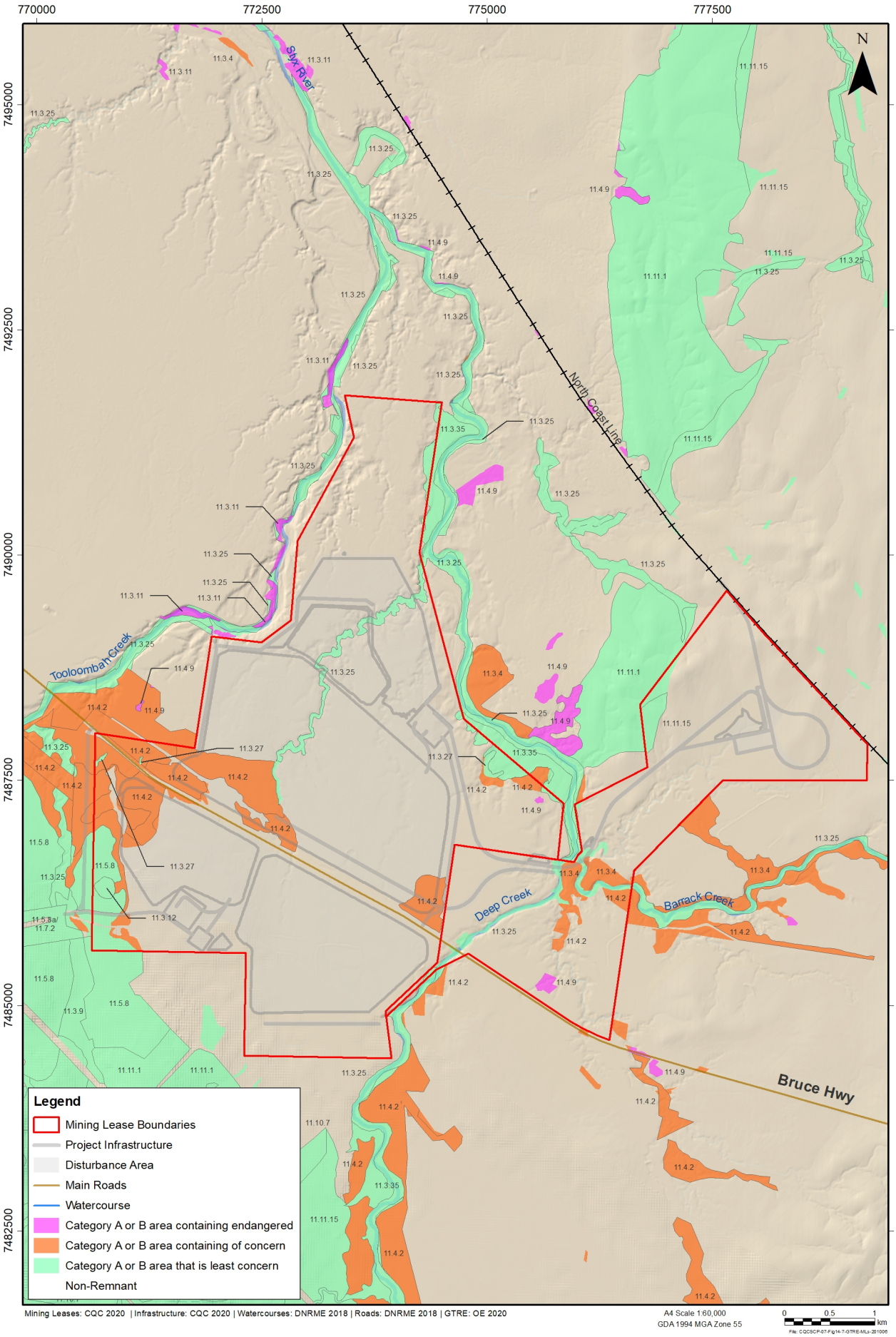


Figure 3-9: Ground-truthed regional ecosystems

Table 3-6: Summary of terrestrial vegetation and flora surveys

Date and duration	Consultant	Scope and survey extent	Method and limitations
Terrestrial vegetation and flora field survey events			
21 to 25 March 2011 (five days)	Oberonia Botanical Services	• Baseline terrestrial vegetation and botanical assessment to assess ecological attributes and values within EPC 1029. • Summer (late wet season) flora survey of EPC 1029 (342 km^2).	• Literature review of PMST report, RE mapping, regrowth mapping, ESA mapping, Wildlife Online, HERBRECS specimen database, Fitzroy Natural Resource Region Back on Track Report (DERM 2010). • Targeted floristic surveys in remnant, high-value regrowth (HVR) and non-remnant vegetation in accordance with Neldner et al. (2005). • Flora sampling methods including: - CORVEG sampling in accordance with Neldner et al. (2005) - 31 wet season and 58 dry season survey sites - species lists – a comprehensive inventory at each survey site and - traverses in accordance with the random meander technique (Cropper 1993). • Due to a prolonged and extensive wet season, a number of sites were inaccessible during the late wet season surveys and the survey sites were confined to accessible roads and tracks. • For the dry season event, access was limited to some properties within the survey area due to a lack of landholder consent.
25 to 29 September 2011 (five days)	Oberonia Botanical Services	• Baseline terrestrial vegetation and botanical assessment to assess ecological attributes and values within EPC 1029. • Spring (dry season) flora survey of EPC 1029 (342 km^2).	
8 to 10 February 2017 (three days)	Terrestria	• Summer (wet season) flora survey of ML 80187 and immediate surrounds.	• Vegetation assessments conducted in accordance with the Queensland Herbariums' Methodology for Survey and Mapping of REs and Vegetation Communities in Queensland, Version 3.1 (Neldner et al. 2017).
17 to 20 July and 6 to 10 August 2018 (nine days)	3D Environmental	• Vegetation survey to refine certified regional ecosystem mapping within areas of Lot 10MC493 and Lot 11MC23. • Habitat quality assessments of proposed offset areas.	• Aerial photographic review with reference to certified RE Mapping (Version 10.1). • Field surveys by two ecologists over a nine-day period in accordance with Queensland herbarium standards as identified in Neldner et al. (2017) with quaternary and secondary sites used to verify RE mapping. • Collection of additional information to satisfy the Guide to Determining Terrestrial Habitat Quality Version 1.2 (2017) and facilitate BioCondition scoring. • 55 vegetation survey sites including 30 BioCondition assessment sites, 3 secondary sites, and 22 quaternary sites. • Mapping of verified REs.

Date and duration	Consultant	Scope and survey extent	Method and limitations
6 to 11 August and 28 to 31 August 2018 (10 days)	3D Environmental	• Identify the source of water utilised by trees for transpiration within areas identified as potential GDEs within the area of potential groundwater drawdown. • Assessments at five sites with potential to be terrestrial GDEs (Wetland 1, Wetland 2, Vine Thicket, Tooloombah Creek and Deep Creek GDE assessment areas).	• Assessment methods were focused on target tree species representative of potential phreatophytes including forest red gum, forest red gum (*Eucalyptus tereticornis*) vine thicket species and melaleuca species. • Assessment methods employed were: - Utilisation of drill core to provide evidence for tree rooting depth and characterise the local hydrogeological conditions - Soil moisture potential (SMP) measurement - Leaf water potential (LWP) measurement and - Stable isotope analysis of xylem water, soil moisture, surface water and groundwater. • Climatic conditions preceding the assessment were extremely dry, which offered ideal conditions for assessment of potential groundwater usage by vegetation.
23 to 27 September 2019 (five days)	Astrebla Ecological Services	• Ground truth regional ecosystem mapping at Mamelon outside of the ML (lots 11 MC23, 10 MC493 and 9 MC496) and lot 9 MC230, except for areas previously ground-truthed by 3D Environmental.	• Aerial photographic review with reference to certified RE Mapping (Version 11.1). • Field surveys by one ecologist over five days in accordance with Queensland Herbarium standards as identified in Neldner et al. (2019). • Mapping of verified REs.
13 to 16 November 2019 (four days)	3D Environmental	• Vegetation survey to refine certified regional ecosystem mapping within areas not captured in the 2018 survey including the haul road and Mt Bison Road.	• Aerial photographic review with reference to certified RE Mapping (Version 11.1). • Field surveys by two ecologists over four days in accordance with Queensland Herbarium standards as identified in Neldner et al. (2019) with quaternary sites to verify RE mapping. • Collection of additional information to satisfy the Guide to Determining Terrestrial Habitat Quality Version 1.2 (2017) and facilitate BioCondition scoring. • 26 vegetation survey sites including 7 BioCondition assessment sites and 19 quaternary sites. • Mapping of verified REs.

Date and duration	Consultant	Scope and survey extent	Method and limitations
September 2019 to June 2020	CO2 Australia	• Ground-truth of regional ecosystem mapping and BioCondition assessments to inform offsets analysis.	• Ground-truthing of RE, vegetation mapping and BioCondition assessments within ML 80187, including along Deep Creek. • Assessments along a tributary of Deep Creek located within ML 80187 and in the north of Mamelon, to support preparation of habitat condition impact assessments for ornamental snake, including three nights of spotlighting in May 2020, by CO2 Australia (led by Dr Jarrad Cousin).

3.6.2.12 Comment 12

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Section 14.6.2.1 Chapter 14 Figure 2 Fauna Survey Locations" Pages: 15-16
Submitters Reference (if provided)	Comment 12; Table 1; 32.85		

Details of the Submission

The department's previous submission recommendation requested that the applicant provide further justification on the adequacy of the location and effort of fauna surveys. No further justification has been provided on the lack of survey sites located along Deep Creek.

Suggested Solutions, Recommendations and Conditions

Understanding the distribution and extent of fauna in the Deep Creek area is necessary as a haul road is proposed to cross Deep Creek. Provide a justification in section 14.5.2.3 for the lack of survey sites along Deep Creek, or an explanation of the adequacy of the extent and location of the surveying.

Proponent Response

A range of fauna surveys for the Project were undertaken from 2011 to 2019 in order to understand the distribution and extent of fauna habitat within the Project Site and Near Surrounds. A summary of all survey events is provided in Table 14-2 of Chapter 14 – Terrestrial Ecology and replicated in Table 3-7 below.

Fauna surveys for Deep Creek and the surrounding areas have been included within the survey coverage, including the following:

- A fauna assessment of Exploration Permit for Coal (EPC 1029) was carried out under summer-season conditions over five days in March 2011 (see Appendix A9a). A wide variety of methodologies were used to sample the diversity of fauna potentially present. Survey coverage included Deep Creek and surrounds.
- A fauna assessment of EPC 1029 was also carried out under early spring (dry season) over five days in September 2011 (see Appendix A9a). Again, a wide variety of standardised and non-standardised methodologies were employed to sample a diversity of fauna potentially present. Survey coverage included Deep Creek and surrounds.
- The fauna surveys in February 2012 used a variety of survey methods designed to target conservation significant fauna species (listed under NCA and/or EPBCA) throughout EPC 1029 (see Appendix A9a). Survey coverage included Deep Creek and surrounds.
- A baseline fauna assessment program focusing on the Project Site and Near Surrounds and staged throughout 2017 (CDM Smith 2018). Survey coverage included Deep Creek and surrounds.
- A series of surveys throughout the Project Area in 2018 using a variety of survey methods designed to target threatened fauna species (MNES and MSES) (CDM Smith 2018). Survey coverage included Deep Creek and surrounds.

- During November and December 2019, MNES and MSES target species surveys and general biodiversity surveys were implemented throughout Deep Creek riparian habitats and surrounding habitats (see Appendix A9c).

The various components of the abovementioned suite of fauna survey programs that are relevant to Deep Creek and near surrounds include the following:

- Systematic fauna survey site - including trapping (Elliot Type A & B box traps, pitfall traps, and funnel traps), diurnal bird surveys, diurnal ground searches for herpetofauna, spotlight searches, microbat call detection surveys, camera trapping, and call playback – three locations.
- Microbat call detection surveys –approximately 20 detector-nights - five locations.
- Call playback surveys – four locations.
- Diurnal ground search site – one location.
- Fauna habitat assessments – seven locations.
- Remote camera surveys - approximately 30 camera-nights - three locations.
- Vehicle-based spotlight searches - approximately nine survey kilometres.
- Dedicated diurnal search transect surveys – approximately 64 kilometers.
- Dedicated nocturnal spotlight search transect surveys – approximately 42 kilometers.

Figure 3-10 illustrates the locations of a variety of fauna survey activities associated with Deep Creek and Near Surrounds which contributed to the EIS and SEIS.

Of the survey results that were able to be spatially analysed, reviews show records of 115 native fauna species that can be confidently attributed to work within the Deep Creek area. The species richness comprises 25 mammal species, nine reptile species, four frog species, and 76 bird species.

It is concluded that the survey work to date has provided a sound understanding of the fauna assemblage associated with Deep Creek and associated fauna habitats. Furthermore, as part of the work by Austecology (2020a), a detailed investigation was focused on MNES and MSES fauna habitat values within and adjacent to the proposed haul road crossing Deep Creek. The findings of that work inform the revised impact assessments for MNES and MSES species and the management plans for these species as recommended in the Project Significant Species Management Plan (SSMP – see Appendix 9e).

Table 3-7: Summary of terrestrial fauna field survey events

Date and duration	Consultant	Scope and survey extent	Method and limitations
Terrestrial fauna field survey events			
21 to 25 March 2011 (five days)	Ed Meyer	• Preliminary assessment to identify values for terrestrial fauna within and adjacent to EPC 1029 with a focus on fauna of conservation significance. • Detailed summer (wet season) fauna survey of EPC 1029	• Systematic surveys at four sites representative of mapped remnant vegetation within EPC 1029 with the following survey effort at each site: - Two 20 minute x 20 ha bird censuses at each site - Elliott trapping (with 20 baited Elliott A and B traps deployed over four nights at each site) - Camera trap surveys (with 5 camera traps deployed over four nights at each site) - Active diurnal searches (1 person hour at each site) - Nocturnal searches/spotlighting (1 person hour at each site) and - Anabat detection of ultrasonic bat calls (with a single Anabat unit deployed for one night at each site). • Supplementary surveys at 18 additional sites within EPC 1029 including bird censuses, diurnal and nocturnal searches, Anabat surveys, and call playback surveys (targeting barking owl, powerful owl, rufous owl and grass owl). • Systematic assessment of habitat values at 16 sites across EPC 1029 to collect information on vegetation structure, floristics, ground cover, disturbance and various other habitat attributes (e.g., presence of tree hollows, stags and exfoliating bark). • Road transects targeting nocturnal fauna and squatter pigeon. • Surveys were undertaken towards the end of an above average wet season with the high levels of rainfall resulting in thick grass cover and high flow of surface water in creeks and drainage lines. • Detectability of a terrestrial fauna and some migratory bird species was reduced as a result of the site conditions including high rainfall, a paucity of flowering eucalypts and bright moonlight.
25 to 29 September 2011 (five days)	Ed Meyer	• Surveys targeting terrestrial threatened fauna within EPC 1029 to compliment March 2011 wet season	• Systematic surveys at four sites broadly representative of mapped remnant vegetation within EPC 1029 with the following survey effort at each site: - Two 20 minute x 20 ha bird censuses at each site - 4 nights Elliott trapping at each site (with 20 baited Elliott A and B traps deployed at each site)

Date and duration	Consultant	Scope and survey extent	Method and limitations
		fauna assessments (Meyer 2011b). • Detailed spring (dry season) fauna survey of EPC 1029.	- 4 days and 4 nights pitfall trapping at each site (with a single trap line comprising four 20 L buckets, 4 funnel traps and a 30 m drift fence at each site) - Camera trap surveys (with 2 camera traps deployed over four nights at each site) - Active diurnal searches (1 person hour at each site) - Nocturnal searches/spotlighting (1 person hour at each site using a headlamp and 50 W spotlight) and - Anabat detection of ultrasonic bat calls (with a single Anabat unit deployed for one night at each site). • Supplementary surveys at nine other sites within EPC 1029 including bird censuses, diurnal searches, Anabat surveys, and call playback surveys (targeting barking owl, powerful owl and yellow-bellied glider). • Systematic assessment of habitat values at 15 sites across EPC 1029 recording habitat values, information on vegetation structure, floristics, ground cover, disturbance and various other habitat attributes (e.g., presence of tree hollows, stags and exfoliating bark). • Drive transects targeting nocturnal fauna and squatter pigeon. • Due to mostly dry conditions during the survey access was improved, however there were still restrictions due to landholder providing access, with the land in the far north-east of EPC1029 unable to be surveyed.
7 to 10 February 2012 (four days)	Ed Meyer	• Surveys targeting threatened terrestrial fauna within EPC 1029 to compliment March 2011 wet season and September 2011 dry season fauna assessments. • The purpose of the survey was to assess areas of EPC 1029 not assessed during previous surveys including in the far north-east and centre east of the EPC and	• Surveys targeted conservation significant species known to occur, or potentially occurring, within EPC 1029 including squatter pigeon, ornamental snake (*Denisonia maculata*), brigalow scalyfoot (*Paradelma orientalis*), yellow chat (Dawson subspecies) (*Epthianura crocea macgregori*), black-breasted button-quail (*Turnix melanogaster*), collared delma (*Delma torquata*), and pale imperial hairstreak butterfly (*Jalmenus eubulus*). • Surveys were undertaken at 10 sites and included a range of techniques including nocturnal searches and spotlighting, active diurnal searches (including log and rock-rolling) and drive transects. • Systematic assessment of habitat values at 10 sites across EPC 1029 recording habitat values, information on vegetation structure, floristics, ground cover, disturbance and

Date and duration	Consultant	Scope and survey extent	Method and limitations
		to better assess values closer to the proposed mine area at the time.	various other habitat attributes (e.g., presence of tree hollows, stags and exfoliating bark). • Wet conditions affected access for vehicles, however, most sites were still accessible by foot. • Limited night light due to cloud cover is likely to have improved detectability of nocturnal fauna, however, a paucity of flowering eucalypts is likely to have affected the abundance of honeyeaters, lorikeets and flying-fox observed.
8 to 13 February 2017 (six days)	CDM Smith	• Detailed summer (wet season) fauna survey of ML 80187 and immediate surrounds. • The February 2017 surveys focused on the MLs and the immediate surrounds including the TLF area.	• Timed 20 minute bird surveys across a 2 ha area carried out opportunistically around bore sites and targeted surveys throughout the ML, particularly targeting dams / wetland areas for Australian painted snipe (*Rostratula australis*), and riparian zones for potential nesting red goshawk (*Erythrotriorchis radiatus*). Total of an additional 59 x 20 minute bird surveys. • Spotlighting surveys carried out on foot and in vehicle within the ML targeting dams, wetlands and gilgai/Brigalow (*Acacia harpophylla*) providing potential habitat for ornamental snake (*Denisonia maculate*) or targeting wooded areas for koala (*Phascolarctos cinereus)* and greater glider (*Petauroides Volans*). Total of an additional 19.5 person hours of spotlighting. • Remote passive infrared cameras were set at 10 sites located within or close to the southern boundary of the ML. Cameras were set adjacent to rocky habitat assessed as potentially suitable for northern quoll den sites (five per site in March 2011 and two per site in September 2011). Cameras were located 3 – 5 m in front of a station baited with a combination of oats, peanut butter, macadamia oil and sardines. Camera traps were set at five sites from 29th September until 10th November. The cameras were moved to five new sites and rebaited on the 11th November. Cameras were collected, and photos downloaded on the 19th December Total of an additional 400 camera trap nights.
May 1 - 5;August 7 – 10; September 18 – 22; November 7 – 12 2017; January 15 – 19 2018	CDM Smith	• Supplementary fauna data obtained during water quality sampling events on ML 80187 and the wider surrounds.	• Supplementary fauna data obtained during water quality sampling events on ML 80187 and the wider surrounds from May 2017 to January 2018. Activities included remote camera surveys, bird surveys / nest searches, herpetofauna searches and spotlighting.

Date and duration	Consultant	Scope and survey extent	Method and limitations
9 to 13 November 2019 (five days/four nights)	Austecology	• Additional threatened fauna surveys to address issues raised by DES regarding survey adequacy along sections of Deep Creek.	• Survey program focused on riparian vegetation within and adjacent to the section of Deep Creek downstream of the Bruce Highway, including the area of the proposed haul road crossing near the confluence of Barracks Creek. • The survey was implemented over five days and four nights by two ecologists and included diurnal and nocturnal searches to assess the presence of koalas and greater gliders. • Diurnal surveys were implemented between 8:00 am and 2:30 pm and included foot-based searches for diagnostic signs of presence (scats, tree trunk scratching), canopy searches for koala, presence of hollow-bearing trees. • Nocturnal searches were implemented between 8:00 pm and 12:30 am and including foot-based spotlight searches to detect presence of greater gliders and koalas. • For an observation of a koala or greater glider, the following was undertaken as a minimum: GPS location recorded and identification of the tree species. Additional information included an assessment of a koala's condition, and age and gender. All survey transects were also recorded with GPS units. • In addition, surveys for microchiropteran bats included deploying two Anabat Express detectors along Deep Creek to record between dusk and dawn for four consecutive nights. • Incidental records of other vertebrate species encountered were also recorded.
December 2019 (two days)	Austecology	• Habitat suitability assessments and target species surveys within the western parts of the Project Site and Near Surrounds	• Habitat suitability investigation and searches for evidence of koala scats, hollow-bearing trees for greater glider and their scats.

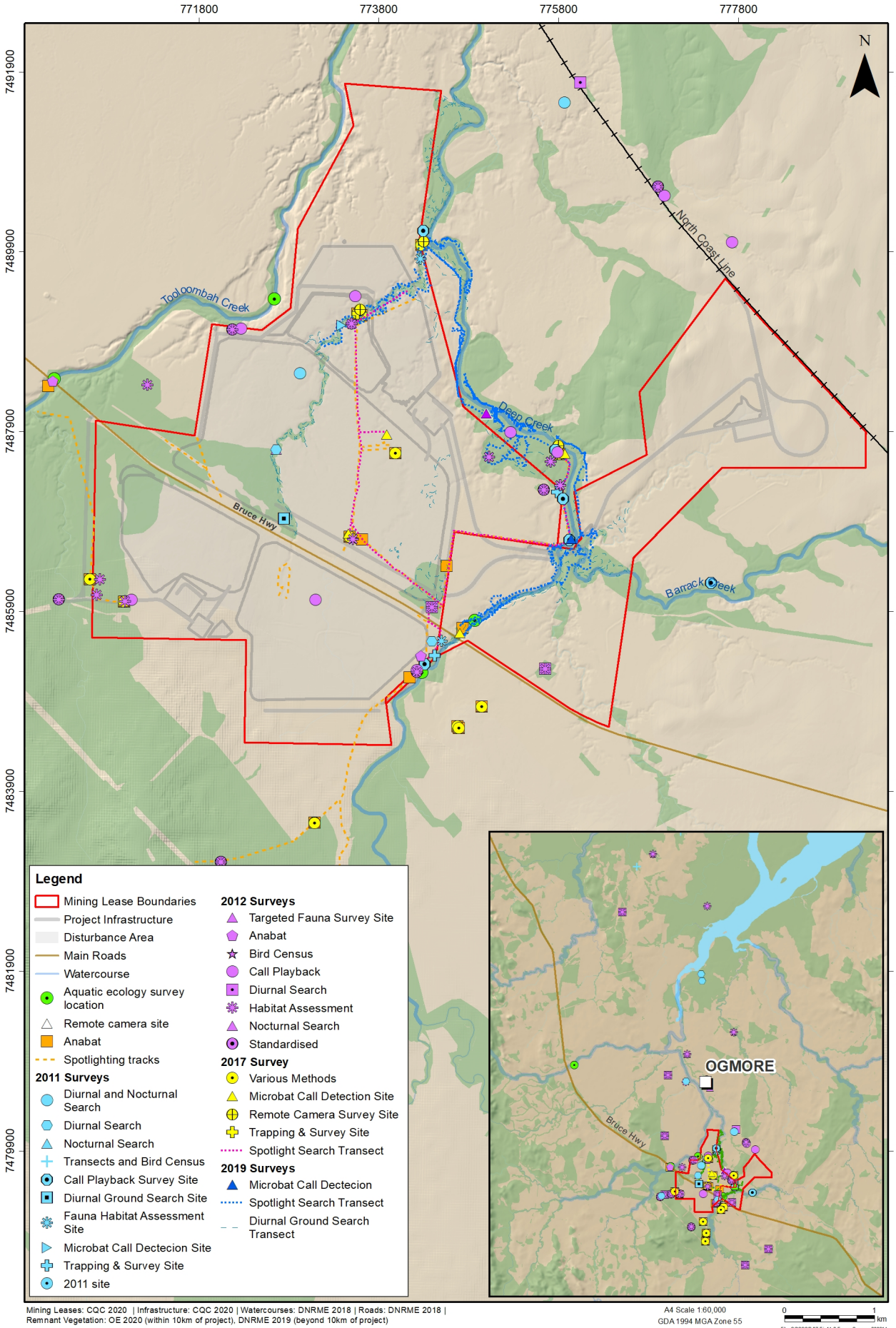


Figure 3-10: Location of fauna surveys for the Project

3.6.2.13 Comment 13

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Chapter 14 - Location of water infrastructure (dam 2)
Submitters Reference (if provided)	Comment 13; Table 1; 32.90		

Details of the Submission

Water infrastructure is proposed to be located over threatened species habitat, endangered/of concern RE or a wetland. The department previously recommended the EIS provide a description of the steps taken to avoid, minimise, or mitigate impacts to regulated vegetation (i.e. could the water infrastructure be located elsewhere; if not, why not?). Section 14.8.9 of the amended EIS states, '*Further details relating to surface water management and water infrastructure design are discussed in Chapter 3 – Description of the Project and Chapter 9 – Surface Water.*' This information cannot be found in relevant EIS chapters.

Justification for the location of these dams has not been adequately addressed. The location of the dams is an issue that is unable to be conditioned in the EA and should be addressed prior to any approval.

Suggested Solutions, Recommendations and Conditions

Provide discussion to justify that the location of the dams took into account avoidance of regulated vegetation. Either:

- clearly outline where in the amended EIS this matter has been addressed or
- explain the steps taken to avoid, minimise, or mitigate impacts to regulated vegetation (i.e. could the water infrastructure be located elsewhere; if not, why not?). This could include an options analysis, and clearly outline how and why the proposed locations are the most suitable.
- A portion of the regulated vegetation (wetland) is proposed to be cleared. A 1 hectare (ha) offset has been proposed for the loss. In order for such an offset to be approved, the 1 ha offset area must be:
  - larger than the area of regulated vegetation to be removed and
  - be of at least the same habitat quality.

The amended EIS should assess whether the proposed partial clearing of the wetland would alter the hydrology of the remaining extent of the wetland. This will assist in determining whether further offsets would be required.

Proponent Response

As described in Section 3 of this chapter, since the finalisation of SEIS v2, several additional changes have been made to the Project layout (see Figure 3-1 and Figure 3-2), operations and equipment to avoid and mitigate impacts on environmental values. This has included revising the mine site water management system and avoiding impacts on threatened species habitat, of concern RE and a wetland, specifically addressing the issues raised above. The changes include:

- Consolidating the water storages and increasing the size of Dam 1 within areas of non-remnant vegetation.

- Complete removal of the former Dam 2 to avoid impacts on least concern RE 11.3.27 (freshwater wetlands) and of concern RE 11.4.2.
- movement of MIA 2 and CHPP 2 to be adjacent to Dam 1, thus avoiding the need for a separate environmental dam and allowing for removal of the former Environmental Dam 2C from the floodplain.
- relocating Environmental Dam 2D from within an area of concern RE 11.3.4 into non-remnant areas adjacent to the Haul Road.
- relocating the haul road which has removed it from the 1% AEP area on the west side of the Deep Creek crossing, and since it coincided with the Dam 2 wall, also avoid impacts to RE 11.3.35 and RE 11.3.27, which are Least Concern, and RE 11.4.2, which is Of Concern. The new location avoids impacts to remnant REs.

3.6.2.14 Comment 14

TOR Category or EIS Chapter	Groundwater; Terrestrial Ecology; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 15, Section 15.7.9
Submitters Reference (if provided)	Comment 14; Table 1; 32.97		

Details of the Submission

The amended EIS has not specifically addressed the potential impacts to potential refugia and nursery areas for aquatic species in any of the chapters identified in the EIS response.

Further information is required to assess the potential impacts of groundwater baseflow reduction along the reaches of affected watercourses.

Suggested Solutions, Recommendations and Conditions

Baseline and GDE studies (including mitigation and management measures) will be a requirement in any approval.

Provide an assessment on the risk of reduced baseflow to hydraulic heads, groundwater recharge and surface water flow.

Should baseflow cease, the ecosystem is no longer groundwater dependent. Provide an assessment of the environmental water requirements of the ecosystem and the contribution of groundwater to inform potential impacts and environmental risks.

Include a predicted effect on altered hydraulic gradients and the potential for increased duration of stream recharge.

It is recommended that the assessment develops baseline and developed scenario conceptualisations for groups of GDEs identified that explicitly identify critical hydrogeological and ecological factors. This conceptualisation informs numerical modelling including, for example, streambed conductivity and aquifer parameters.

Provide reference to the 'EIS information guideline – Groundwater dependent ecosystems' around the development of conceptualisations, consideration of potential impacts, and avoidance and mitigation measures in the proposed monitoring plan.

This information should be included in a Draft GDEMMP.

Proponent Response

3.6.2.14.1 Baseline and GDE studies (including mitigation and management measures) will be a requirement in any approval.

Baseline and impact assessments of GDEs have been undertake and are presented in the Aquatic and Marine Ecology, GDE and the GBR Impact Assessment contained in Appendix 10a. The findings are summarised below, along with references to the relevant sections in the SEIS chapters.

Subterranean GDEs

See Section 15.6.2.1 of Chapter 15 for the impact assessment on Subterranean GDEs.

The main aspect of the Project impacting aquifer ecosystems is the dewatering required prior to and during excavation. This has the potential to remove areas of stygofauna habitat, and as the drawdown cone extends across the width of most of the alluvial water table aquifer, to isolate communities south of the mine from those in the more extensive sediments to the north. This may have a localised impact on the stygofauna community of the central Styx River alluvium, and could also reduce diversity in the southern part of the aquifer over the life of the mine, since migration pathways will be severed.

The risk assessment for impacts on stygofauna concludes that the drawdown in alluvium from aquifer dewatering is likely to result in direct disturbance to stygofauna habitat. Stygofauna will be lost from the area of impact around the mine, and communities upslope of the mine will be isolated from downstream communities. However, it is the lower reaches of the Styx alluvium, and areas adjacent to the main creeks where stygofauna diversity is likely to be highest. Any taxa living in the area modelled for drawdown are likely to also occur in the downstream reaches which will remain unaffected by drawdown.

As such, overall, the impacts on stygofauna are considered to be acceptable, as they will result in the localised loss of assemblages that are likely to be well represented in adjacent areas. Extensive monitoring of GDEs including stygofauna will be undertaken as part of the adaptive management approach outlined in the GDEMMP. Stygofauna sampling will occur ahead of groundwater drawdown occurring, targeting the upper freshwater sections of aquifers. Samples will also be collected from locations outside of groundwater drawdown areas to understand stygofauna distribution patterns across the broader Styx River basin.

Aquatic GDEs

See Section 15.6.2.1 of Chapter 15 for the impact assessment on Aquatic GDEs.

The impact assessment found that the impacts of groundwater drawdown on Aquatic GDEs is expected to be relatively minor because:

- Drawdown at Tooloombah Creek is relatively small (<4 m) and the sediments in these locations have a low permeability (reducing the potential for enhanced leakage).
- Bank storage is likely to be the main source of any groundwater inputs to Tooloombah Creek and this is unlikely to be significantly affected by groundwater drawdown. This is because any downward movement of water held in bank storage is restricted, to some extent, by the impermeable layer of weathered clay underlying the alluvium of Tooloombah Creek. In addition, because drawdown of the water table aquifer at Tooloombah Creek is relatively small and sediments at these locations have a low permeability, the potential for enhanced leakage is reduced.

- The persistence of bank storage and associated return flows to Tooloombah Creek are likely to provide safeguards to mitigate impacts on pool persistence from drawdown of the water table underneath the creek. Flows from bank storage were predicted to reach the creek for a period of approximately 150 days.
- Permanent pools are likely to still persist throughout most of the dry season, even under the worst-case scenario, with improvements in water quality (less variation in salinity).
- Most pools at Deep Creek are ephemeral. Whilst ephemeral pools are likely to dry up more quickly and for longer than under existing conditions, especially in the middle reaches of Deep Creek, these pools experience a natural cycle of drying under existing baseline conditions, and the aquatic ecosystem is adapted to these cycles.
- Recolonisation of pools will occur naturally as it currently does under existing conditions following rainfall, once the creeks begin flowing again. Flow currently occurs approximately 24% of the time and will not be affected by the Project. In addition, aquatic fauna recorded in pools during field surveys are all common species considered typical of a Central Queensland coast catchment.
- Groundwater drawdown is not predicted to occur beneath the Styx River and therefore loss of potential baseflow from Aquatic GDEs in downstream areas is not considered to be a potential impact of the Project.

Terrestrial GDEs

Based on the results of the impact assessment presented in Chapter 14 – Terrestrial Ecology (see Section 14.3.5.4), it is concluded that groundwater drawdown would result in at least a 'Possible' likelihood of there being a 'Minor' impact on vegetation within three stream reaches along Deep Creek. The area predicted to be possibly affected consists of 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4.

The assessment demonstrates that impacts on vegetation as a result of groundwater drawdown are likely to vary in scale along the different stream reaches. For the majority of the 165 ha expected to potentially be affected, impacts are likely to manifest as a gradual reduction in BioCondition scores, canopy cover and canopy height. In some areas vegetation may no longer meet the Regional Ecosystem description, however, will continue to provide ecosystem services, including minimising erosion and some fauna habitat, but with elevated weed cover. Impacts can be expected to commence over timeframes of 10 to 20 years after commencement of the Project.

Based on this assessment, the complete loss of vegetation and ecosystem services, including bank stability, is considered highly unlikely to occur at either Tooloombah or Deep Creek. This result, combined with a study of geomorphological values, indicates that bank collapse is unlikely to occur as a result of the Project.

It should be noted that the impact assessment for Terrestrial GDEs is considered to be a worst-case scenario assessment. In identifying potential groundwater dependent RE, only areas with a groundwater level deeper than 15 mbgl were excluded from the assessment (see complete details in Chapter 14 – Terrestrial Ecology). This approach is considered to be conservative, as known depths to water table in published sources are generally reported as a maximum of 10 m for the vegetation species present within the Project Site (IESC 2018) In addition, it was assumed that the maximum EC of groundwater that may sustain terrestrial vegetation at the site is 10,000 µS/cm. Whereas, the upper soil salinity tolerance of key vegetation species present in the Project Area is generally

equivalent to an EC of 4,000 to 8,000 µS/cm (DoA 2020). Therefore, it is possible that the area to be affected may be substantially less than 165.23 ha.

3.6.2.14.2 Provide an assessment on the risk of reduced baseflow to hydraulic heads, groundwater recharge and surface water flow.

The risk of reduced baseflow to hydraulic heads, groundwater recharge and surface water flow has been accounted for in the GDE impact assessments. Refer to the above response (Section 3.6.2.14.1).

3.6.2.14.3 Should baseflow cease, the ecosystem is no longer groundwater dependent. Provide an assessment of the environmental water requirements of the ecosystem and the contribution of groundwater to inform potential impacts and environmental risks.

The environmental water requirements of the GDEs has been specifically considered in the GDE impact assessments. Refer to the above response in Section 3.6.2.14.1).

3.6.2.14.4 Include a predicted effect on altered hydraulic gradients and the potential for increased duration of stream recharge.

As summarised in Section 10.3.7 of Chapter 10 – Groundwater, the available data (observed pools persistence, water quality data particularly EC and water level changes over time, lithological descriptions and groundwater levels in alluvial and regolith cross sections across the creeks) supports increasing persistence of pools moving downstream (i.e. downstream of the Project site) in Tooloombah Creek; the lack of persistence in Deep Creek (other than potentially downstream near the confluence); the primary source of baseflow to pools being bank flow return rather than the dry season water table, which is typically lower than the creek bed, and saline water sourced from seasonally elevated water tables – the exception to this is some locations where the Styx Coal Measures outcrop into these pools, with one such pool identified at the location of the stream flow gauge.

Essentially, the assessments and the data above show that while seasonally elevated water tables recharge bank storage, which feeds back to the pools during part of the dry season, the water table declines typically to below the creek bed during the dry season, and so an unsaturated zone exists underneath most sections of the creeks. Therefore, direct drawdown impacts on the pools within both creeks are unlikely – i.e. since water table aquifers do not supply the creeks in the dry season directly, and since an unsaturated zone exists underneath the creeks (the water table is already below the base of the creeks), any further drawdown within the water table would not change this, and seepage would remain limited by the existing rate of infiltration from the creeks.

There is the potential for the drawdown of the regional water table to reduce the recharge of bank storage from seasonally elevated water tables in some locations. However, since recharge and return flow from bank storage is very local (the work presented in the Surface Water/Groundwater Interactions Report in Appendix A6d found that recharge and discharge was limited in lateral extent, in part due to the lower permeability in the Quaternary Pleistocene Alluvium), any drawdown impacts would also be limited on the bank storage. There may be a change to groundwater inflows from outcropping Styx Coal Measures in some parts of Tooloombah Creek. WRM undertook an assessment of the impact to the Tooloombah Creek stream gauge pool of reducing the modelled groundwater inflow. This showed that reducing the groundwater inflow to zero, the pool would continue to contain water about 96% of the time, only drying out during major drought conditions.

Given the low permeability of Tooloombah Creek sediments, the opportunity for enhanced leakage to further reduce pool persistence is likewise limited.

As such and given that 1) bank storage is identified as the major component of baseflow in pools, 2) that it is quite local to each stream section investigated, 3) the low permeability of the coal measures (i.e. low ability to lose water from the alluvium downward to the coal measures) and 4) the lower permeability of the Quaternary Pleistocene Alluvium on terraces and patchy nature of the higher permeability Quaternary Alluvium (i.e. not continuous to the pits), then the impacts on stream recharge are expected to be low, and changes to hydraulic gradients in relation to streams would be likewise low.

3.6.2.14.5 It is recommended that the assessment develops baseline and developed scenario conceptualisations for groups of GDEs identified that explicitly identify critical hydrogeological and ecological factors. This conceptualisation informs numerical modelling including, for example, streambed conductivity and aquifer parameters.

Conceptualisations of the GDEs assessed as part of the Project is provided in the GDE technical assessments (Surface Water/Groundwater Interactions Report in Appendix A6d, Aquatic & Marine Ecology, GDE and GBR Impact Assessment in Appendix A10a), with the broader parameterisation and conceptualisation addressed as part of the numerical groundwater model conceptualisation and model development in the Groundwater Model and Assessment Report in Appendix A6b. The conceptualisations have assessed the processes occurring within the GDEs which have informed the potential impacts on these GDEs that could occur.

Section 10.3.7 of Chapter 10 – Groundwater summarises the above work in terms of hydrogeological processes and adds additional data along the Tooloombah Creek reaches investigated, including cross sections and water quality data.

3.6.2.14.6 Provide reference to the 'EIS information guideline – Groundwater dependent ecosystems' around the development of conceptualisations, consideration of potential impacts, and avoidance and mitigation measures in the proposed monitoring plan.

The GDE impact assessment, including conceptualisations and avoidance and mitigation of impacts, has followed the method outlined in the GDE Toolbox (Richardson et al. 2011), which is derived from descriptions in Clifton et al. (2007) and Tomlinson (2011). The assessment has also been guided by an Explanatory Note on GDEs released by the Independent Expert Scientific Committee on Coal Seam Gas and Large Coal Mining Development (Doody et al. 2019), and the Queensland Government EIS Guideline for GDEs (Queensland Government 2019).

3.6.2.14.7 This information should be included in a Draft GDEMMP.

A draft GDEMMP has been prepared for the Project and is provided in Appendix 10e. The purpose of the GDEMMP is to minimise and manage the environmental impacts of the Project on GDEs through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and post operations. The objectives of the GDEMMP are as follows:

- Present the assessed impacts and threats to groundwater and ecological attributes for each of the GDEs.
- Detail the ecological and groundwater values that have been monitored during baseline phases of the Project.

- Identify management goals and triggers for each GDE, which will be refined over time as further information becomes available during the pre-impact and impact phases of the Project.
- Provide details of a monitoring program for both pre-impact and impact phases of the Project, including how this monitoring will build on existing baseline information, and inform the implementation of relevant mitigation, management and offset measures.
- Describe mitigation and management measures with specific criteria, timing, performance objectives, goals and corrective actions.
- Provide sufficient information on the intended management of GDEs to allow the Queensland and Commonwealth governments to make an assessment of the Project under relevant legislation.

The GDEMMP includes monitoring of groundwater quality and level at key GDE locations, ongoing validation and recalibration of the groundwater model, identification of management measures, triggers and corrective actions for each GDE, and a process of adaptive management where the results of monitoring inform the ongoing implementation of management measures.

It is expected that the Draft GDEMMP will be further refined in the post-EIS phase of the Project in response to feedback from the Department, before being finalised and certified by a suitably qualified person for implementation. The GDEMMP will be subject to annual reviews and independent peer review of the results during implementation.

As part of the GDEMMP, the potential impacts of groundwater drawdown on riparian vegetation along Deep Creek will be mitigated through the implementation of a revegetation program with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed to ensure the planting of drought tolerant species of similar ecological function as those with the potential to be impacted. This will ensure that existing habitat for terrestrial species is maintained, as well as reducing the potential for consequential impacts such as erosion and sedimentation which may be associated with vegetation loss. The revegetation program will be implemented from Project commencement ensuring sufficient timeframes for establishment of vegetation, given potential impacts are not expected to commence until at least 10 years after Project commencement.

3.6.2.15 Comment 15

TOR Category or EIS Chapter	Groundwater; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 15, Section 15.7 - Potential Impacts
Submitters Reference (if provided)	Comment 15; Table 1; 32.98		

Details of the Submission

The department has previously requested the amended EIS provide a detailed assessment on the potential impact of saltwater ingress on freshwater aquatic or terrestrial groundwater dependent species.

Suggested Solutions, Recommendations and Conditions

The potential impact of saltwater ingress on freshwater aquatic or terrestrial groundwater dependent species should be addressed in the revised EIS.

Provide detailed information that shows the modelling of the tidal/estuarine zone during and post mining.

Proponent Response

There are two mechanisms through which salt water ingress may affect Aquatic or Terrestrial GDEs in the vicinity of the Project. These are:

1. A change in surface water (hydrological) conditions, causing tidally transported saline marine waters to extend further upstream within the Styx River and tributaries than occurs currently under baseline conditions.
2. Depressurisation of groundwater aquifers, resulting in the movement of saline groundwater into new areas that are utilised by GDEs.

CQC has commissioned new technical studies to investigate the potential impacts of the Project on surface water and groundwater resources, and to specifically investigate the likelihood of these two modes of impact occurring (See Appendix 5b and Appendix 6b, respectively).

The Project is not expected to result in any major changes to the natural hydrological conditions of Tooloombah and Deep Creeks, and therefore also not to the Styx River. While some runoff within the creek catchments will be captured and retained on site within the mine footprint, the amount of water involved is minimal compared with that entering the creeks as runoff from the broader catchment (see Chapter 9 – Surface Water). In this regard, the existing ephemeral nature of the creeks and the current flow regime will remain unchanged, and connectivity along the creek systems and into the downstream environments will not be affected.

Surface water modelling also predicted that there will be no substantial change to the number of 'no flow' days in the system under a mining scenario. Tooloombah and Deep Creek are ephemeral and only flow for 24% of the time. Therefore, for 76% of the time there is no influence of Tooloombah or Deep Creek, which could affect the tidal limit, on the downstream environment. The amount of flow days will not change as a result of Project operations (see Section 9.6.2.1 of Chapter 9 – Surface Water). Downstream areas will continue to be primarily influenced by the tidal regime of the Styx River estuary and Broad Sound marine environment. This, combined with the minimal reduction in hydrological regime and the large downstream influence of tides, suggests there will be no change in the location of the freshwater – saltwater interface within surface waters of the Styx River.

The Project is not expected to result in any discernible change to the location of the freshwater-saltwater interface. Section 10.3.6.6 of Chapter 10 – Groundwater explains how the closest extent of the fresh-seawater interface is well beyond the influence of the Project, based on both theoretical and observational data.

The groundwater modelling has provided (in Figure 8-6, Attachment 3, in the SEISv3 Appendix A6a) groundwater flow directions in the Cainozoic/regolith and Styx Coal Measures layers for pre-mining, during operations, and post mining, showing that Project influence on groundwater flow directions diminishes to effectively nil at the Tooloombah – Deep Creek confluence, which is only 2.2km downstream of the Project, where the theoretical seawater interface surface would be below -280 mAHD, which is well beneath the predicted extent of drawdown. At the Ogmore bridge and WMP29 bore locations, both well outside the drawdown extent, and approximately 4km downstream of the Project, the theoretical fresh-seawater interface is still at least -40 to -80 mAHD. Any fresh-seawater interface at a shallower depth closer to the coast is well beyond the influence of the drawdown zone and any influence of the Project on groundwater flow direction.

The assessment of cumulative impacts, including impacts relating to the historic mine workings at Ogmore and Bowman (refer to the Groundwater Model and Assessment Report in Appendix A6b), concluded that the predictive cumulative modelling results demonstrate there is unlikely to be any superposition effects, thus, the predicted cumulative drawdown impacts at private landholder bores, springs, wetlands, GDEs, Broad Sound Declared FHA and on recorded groundwater fauna locations / stygofauna habitat and riparian vegetation are equivalent to the Project alone.

Therefore, there is not expected to be any discernible change to the location of the fresh-seawater interface.

As such, given there will be changes to saltwater -freshwater interfaces in either surface or groundwaters, there will be no impact as a result of the Project current flow patterns within the Styx River that would affect the location of the current tidal/estuarine zone.

3.6.2.16 Comment 16

TOR Category or EIS Chapter	Groundwater; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Section 15.8.9.2, Chapter 15, Mitigation measures
Submitters Reference (if provided)	Comment 16; Table 1; 32.99		

Details of the Submission

The proposal includes a commitment to ongoing monitoring and mitigation of impacts to stygofauna by supplementing natural stream flows to buffer drawdown effects (see Table 10-86). There is uncertainty around the likelihood of successfully mitigating impacts and it was not clear whether the mitigation measure proposed would be effective.

Suggested Solutions, Recommendations and Conditions

Provide evidence that the proposed supplementary water mitigation measure would be effective in mitigating the loss of stygofauna species and habitat. Include evidence to support expected stygofauna mobility within the water column at proposed drawdown rates.

Proponent Response

The results of the updated groundwater study indicate the potential for only small changes in Tooloombah and Deep Creek baseflow due to predicted drawdown in groundwater levels caused by the Project. Based on the small magnitude of this change, supplementing dry-weather creek flows with water from the Project is no longer proposed as a mitigation measure. Furthermore, this is not considered a viable mechanism to mitigate any effects of the Project on stygofauna.

The study area is likely to contain a mosaic of areas that are suitable and unsuitable for stygofauna, depending on local hydrogeological conditions and the depth of underground water resources. The Aquatic and Marine Ecology and GDE Impact Assessment (Appendix 10a) concluded that there was a high likelihood that stygofauna communities extend throughout the Styx River alluvium, as well as the alluvium of Tooloombah Creek and Deep Creek, but that their distribution is generally limited to parts of the aquifer where electrical conductivity is less than 7,000 µS/cm. EC in the central part of the aquifer is higher (up to 37,400 mg/L) than in the coastal section near Broad Sound, or close to waterways, and is less suitable for stygofauna.

The residual risk of impacts from groundwater drawdown on stygofauna was assessed to be Medium. The residual risk of all other modes of impact on stygofauna was assessed to be Low, as a

consequence of the likely widespread distribution of stygofauna in areas adjacent to the Project area, which will not be impacted by groundwater drawdown.

Hence, overall, impacts on stygofauna are considered to be acceptable, as they will result in the localised loss of assemblages that are likely to be well represented in adjacent areas. Extensive monitoring of Aquatic and Terrestrial GDEs including stygofauna will be undertaken as part of the adaptive management approach outlined in the Draft GDEMMP (Appendix 10e). Baseline stygofauna sampling will continue into the pre-impact phase, ahead of groundwater drawdown occurring, targeting the upper freshwater sections of aquifers where stygofauna are most likely to occur. Samples will also be collected from locations outside of groundwater drawdown areas to better inform the understanding of stygofauna distribution patterns across the broader Styx River Basin, and possible interactions with those closer to the Project.

As such the measures put forward in the GDEMMP (Appendix 10e) to monitor and manage impacts to stygofauna are considered sufficient and suitable to mitigate and monitor for stygofauna. Table 5-7 of the GDEMMP puts forward a range of management objectives, performance criteria, adaptive management triggers and corrective actions for Subterranean GDEs (stygofauna).

3.6.2.17 Comment 17

TOR Category or EIS Chapter	Terrestrial Ecology; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Chapter 15, Section 15.10, p.15-80
Submitters Reference (if provided)	Comment 17; Table 1; 32.100		

Details of the Submission

Offsets are discussed in relation to vegetation and wetland clearing. However, this would occur only after monitoring determines mitigation is unsuccessful (section 15.11.1.2).

Suggested Solutions, Recommendations and Conditions

Clearly describe how impacts would be defined should mitigation measures be unsuccessful. How would offsets then be applied?

All required offsets for GDEs and species must be identified within the GDEMMP.

Proponent Response

In SEIS v2, Chapter 15, Section 15.11.1.2 states that:

"*There is potential in the long-term for remnant vegetation classified as Least Concern watercourse vegetation to be adversely impacted by groundwater drawdown in the vicinity of open cut mining operations. Where this community occurs within the predicted zone of groundwater drawdown impact these areas will be subject to vegetation health monitoring as part of the Project LUMP and REMP. Areas mapped as RE 11.3.25 have a low to moderate threat of being impacted where groundwater drawdown is less than 1 m. Above this level there is a moderate to high threat (Figure 15-27). Areas mapped as RE 11.3.4 are located within the predicted 5 m drawdown contour where a low to moderate threat has potential to occur.* ***In the event that impacts have been found to occur and mitigation actions are unsuccessful these areas will also be subject to the Project's environmental OMP.***"

This statement, and the corresponding comment from DES, is no longer relevant because CQC has calculated all direct and indirect impacts of the Project on regional ecosystems, including impacts associated with groundwater drawdown on watercourse vegetation.

Impacts on all regulated vegetation are now presented in Chapter 14. Specifically, the revised impacts of the Project on Terrestrial GDEs (which includes watercourse vegetation) is provided in Chapter 14 – Section 14.6.1.2. Groundwater drawdown is predicted to have the potential to impact 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4. This prediction is based on conservative assumptions (see Section 14.3.5.4 of Chapter 14) and a worst-case scenario impact assessment and so it is possible that the area to be affected may be substantially less than 165.23 ha.

As previously described, decline in vegetation condition is expected to occur gradually and will not commence until at least 10 years after Project commencement. Impacts are considered likely to manifest through a gradual reduction in the condition of structural elements of the vegetation communities. In these areas BioCondition scores, canopy cover and canopy height could be expected to decline over time and the vegetation may no longer meet the RE description.

Significant impact assessments as a result of direct and indirect impacts on Regional Ecosystems that are MSES, including watercourse vegetation, are presented in Chapter 14 – Section 14.6.2. The results of this assessment are summarised below in Table 3-8.

Where there is determined to be a significant residual impact on watercourse vegetation (or any MSES) offsets for these impacts are addressed in the Project's Biodiversity Offset Strategy (see Appendix 11a), rather than the GDEMMP. The Biodiversity Offset Strategy outlines how the Project's anticipated offset requirements will be acquitted and CQC's approach to delivering these offsets in accordance with the Queensland Environmental Offsets Policy (Version 1.8; DES 2020).

A reconciliation process has been established as part of the Biodiversity Offset Strategy. In addition to any compliance reporting described in the Offset Area Management Plans, or in subsequent Project approval conditions, CQC will also prepare an offset reconciliation report for the Biodiversity Offset Strategy five years after approval of the BOS. This report will be submitted to the Commonwealth and State administering authorities and will reconcile actual significant residual impacts of the Project on MNES and MSES with actual offset areas legally secured. The reconciliation review and report will ensure that commensurate offsets have been delivered and relevant conditions of approval have been fulfilled. If this review and report finds any additional offsets are required for the Project, the Biodiversity Offset Strategy will be updated accordingly and resubmitted to regulators for approval/endorsement.

A draft GDEMMP has also been prepared with the aim of minimising and managing the environmental impacts of the Project on GDEs (including Terrestrial GDEs which are watercourse vegetation). As part of the draft GDEMMP a monitoring program has been developed, to determine whether mitigation and management measures are adequate and successfully implemented. This work will build upon the baseline studies completed during the EIS and SEIS.

As part of the GDEMMP a revegetation program will be implemented in areas within the riparian corridor expected to be affected by groundwater drawdown with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed to ensure the planting of drought tolerant, non-groundwater dependent species of similar ecological function as those with the potential to be impacted. Further

details of the revegetation program are presented in Section 14.7 of Chapter 14 – Terrestrial Ecology.

Table 3-8: RE MSES Impacts

MSES (structural category)	Impact (ha) Direct	Indirect	Total	Significant Impact Assessment	Significant impact?
Of Concern RE					
RE 11.3.4 (Sparse)	1.39	39.31	40.70	The direct clearing is for linear infrastructure and is greater than 20 m. The indirect impact associated with groundwater drawdown is greater than 20 m wide and greater than 2 ha.	Yes
RE 11.4.2 (Sparse)	110.78	0.00	110.78	The direct clearing is generally for non-linear infrastructure and is greater than 2 ha.	Yes
RE located within a defined distance of a relevant watercourse					
Watercourse RE 11.3.4 (Sparse)	0.52	3.78	4.30	The direct clearing is for linear infrastructure, is greater than 20 m and is within 5 m of the defining bank. The indirect impact associated with groundwater drawdown is greater than 20 m wide, greater than 2 ha and is within 5 m of the defining bank.	Yes
Watercourse RE 11.3.25 (Sparse)	10.74	68.06	78.80	The direct clearing is generally for non-linear infrastructure and is greater than 2 ha and is within 5 m of the defining bank. The indirect impact associated with groundwater drawdown is greater than 20 m wide, greater than 2 ha and is within 5 m of the defining bank.	Yes
Watercourse RE 11.4.2	1.10	0.00	1.10	The direct clearing is generally for non-linear infrastructure and is less than 2 ha and is within 5 m of the defining bank. There is no indirect impact.	No
Watercourse RE 11.3.35 (Sparse)	0.00	1.84	1.84	There is no direct impact. The indirect impact associated with groundwater drawdown is greater than 20 m wide, however, is less than 2 ha and is not within 5 m of the defining bank.	No
RE that is an area of essential habitat for vulnerable animals					
Greater glider	0.00	15.00	15.0	See Section 14.6.5.1.1 of Chapter 14	Yes
Koala	96.10	14.34	110.4	See Section 14.6.5.1.2 of Chapter 14	Yes
Ornamental snake	0.00	6.73	6.73	See Section 14.6.5.1.3 of Chapter 14	Yes
Squatter pigeon	14.64	14.27	28.91	See Section 14.6.5.1.4 of Chapter 14	No

3.6.2.18 Comment 18

TOR Category or EIS Chapter	Project Description; Land; Surface Water	Submitters Reference to EIS Section (if provided)	Chapter 5 – Section 5.11.4 –p 5-125
Submitters Reference (if provided)	Comment 1; Table 2; 32.1		

Details of the Submission

This issue requires clarification. Section 9.7 states that 'the primary function of the environmental dams is to capture sediment laden runoff for sediment removal'. The proponent should note the definition of MAW provided in the model mining conditions indicates MAW is "rainfall runoff which has been in contact with any areas disturbed by mining activities which have not yet been rehabilitated, excluding rainfall runoff discharging through release points associated with erosion and sediment control structures". Erosion and sediment control structures are suitable to treat sediment only and not toxicants that may be generated from the activity. Based on Figure 9-94 'Proposed water management network', MIA1 is the only dam that does not flow to a MAW release point that would be regulated under the EA.

Suggested Solutions, Recommendations and Conditions

Amend the revised EIS to ensure MAW is not treated via environmental dams.

Proponent Response

There is no treatment of MAW via environmental dams.

In general, dams other than Dam 1 (the main site storage) and Dam 4 (dam servicing the TLF area) have been classified as Environmental Dams. Dams which contain MAW are clearly identified in Table 9-10 of Chapter 9 – Surface Water, which includes Dam 1, Dam 4 and Environmental Dam 1C. Dam 1 (controlled release point plus spillway) and Dam 4 have been included as proposed authorised release points for MAW from the site – refer to Section 9.4.3.9 of Chapter 9 – Surface Water. Environmental Dam 1C does not discharge off-site and so is not an authorised release point.

Note that the operating rules for the site water management system are based on pumping water from sediment dams to the primary mine water Dam 1. This means that under most climatic conditions there will be no discharge from sediment dams to the receiving environment. Overflows from sediment dams to receiving watercourses would only occur during significant rainfall events that exceed the dam capacity. During these conditions, significant dilution flows would occur in receiving watercourses. An assessment of the likelihood and volume of overflows from sediment dams to receiving waters is presented in section 8.4.8 of the Flood Study and Water Balance in Appendix A5b. The risk of overflows from sediment dams is small (around 1%). The impacts of sediment dam overflows on receiving water quality are included in the assessment of site water quality impacts presented in section 8.4.10 of the Flood Study and Water Balance in Appendix A5b.

3.6.2.19 Comment 19

TOR Category or EIS Chapter	Surface Water; Groundwater; Aquatic Ecology; MNES	Submitters Reference to EIS Section (if provided)	Chapters 9, 10, 15 and 16
Submitters Reference (if provided)	Comment 2; Table 2; 32.7		

Details of the Submission

This issue has not been adequately addressed. This may be because attempts would be made to mitigate the risk of impacts to riparian vegetation communities. There is uncertainty that such strategies would be effective. The EIS should identify all potential environmental risks and ensure proposed mitigation strategies would be effective.

The department notes that fine suspended sediments are known to aggregate with nutrients and are easily re-suspended leading to persistent turbidity regimes. High sedimentation rates can also smother corals leading to increased macroalgal cover and more coral disease outbreaks, and reduce light available for photosynthesis for seagrass and mangroves.

Suggested Solutions, Recommendations and Conditions

Provide analysis of the potential for the worst-case scenario of riparian and terrestrial ecosystem collapse from groundwater drawdown impacts. This would require an assessment of potential sediment loads to the GBR in order to fully consider the risk of the supplementary water mitigation measure not being successful.

The amended EIS should assess the potential consequential impacts from bank slumping and sediment export mobilised by potential flood events to downstream sensitive ecosystems.

A sediment load monitoring program must be undertaken upstream and downstream of the proposed mine area. The program should assess the potential impacts of mining operations, including MAW releases, stormwater releases through Erosion and Sediment Control structures and watercourse diversions, on the watercourse channel bed load, including the contribution of sediment from the mine to the Styx catchment.

Provide a detailed assessment on whether significant mobilised sediment loads entering the Styx River system and Broad Sound would potentially cause adverse impacts on habitat for listed migratory species, fish habitat values of the Broad Sound FHA and on the values of the GBRWHA.

Proponent Response

CQC commissioned ELA to complete an updated assessment of the impacts of the Project on Aquatic and Terrestrial GDEs, including riparian vegetation and the aquatic habitats of Tooloombah Creek and Deep Creek, included in Appendix A10a - Aquatic and Marine Ecology, GDE and GBR Impact Assessment. The assessment was informed by new technical studies including surface water modelling (Flood Study and Water Balance, Appendix A5b), a regional groundwater model (Groundwater Model and Assessment Report, Appendix A6b), a study of geomorphology values (Fluvial Geomorphology, Appendix A5d) and a sediment budget for the Project site (Sediment Loads Assessment, Appendix A15b).

The assessment of worst-case impacts of the Project on riparian vegetation from groundwater drawdown concluded that up to 165 ha of riparian vegetation along Deep Creek may be subject to

changes in ecological condition, likely a gradual reduction in the condition of structural elements of the vegetation communities. In these areas BioCondition scores, canopy cover and canopy height could be expected to decline over time and the vegetation may no longer meet the RE description. The assessment found that widespread vegetation loss was unlikely and that if individual trees were lost, that these would be replaced by more drought tolerant species, and shallower rooting species of shrubs and grasses. This result, combined with a study of geomorphological values, indicates that bank collapse is unlikely to occur as a result of the Project.

As determined in the Sediment Loads Assessment in Appendix A15b, the cessation of cattle grazing across large parts of the Project area and associated offset areas, combined with the water capture and treatment system of the proposed mine, will result in an approximately 50% reduction of sediment runoff to the GBR from existing baseline conditions. At least 95% of sediments up to 0.045 mm diameter would be captured and retained within the site under typical flow conditions through rapid settlement of coarse grained particles during all storm events and settlement of fine grained particles under controlled conditions. Based on this assessment, the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%.

A detailed draft ESCP has also been prepared for the Project (refer Appendix A15a) which identifies the measures to be implemented to control erosion and sediment runoff from the site.

A detailed geomorphological study of the Project (refer Appendix A5d) identified some localised areas where modelled velocity and bed shear stress values were such that specific mitigation and/or monitoring actions were recommended. However, the study found the overall risk of rapid and significant geomorphic change due to the proposed mining activity was negligible.

A detailed assessment of impacts on downstream values by ELA, including the Broad Sound Wetland, Broad Sound FHA and Great Barrier Reef Marine Park and World Heritage Area (Appendix A10a), found that impacts on these values were unlikely.

A draft REMP (Appendix A10f) has also been prepared. It includes a network of monitoring sites located upstream, adjacent to and downstream of the Project site. Monitoring completed as part of the REMP will include surface water quality, sediment quality, aquatic ecology and marine ecology values, and will provide an opportunity to validate the findings of the impact assessment that there will be negligible impacts to downstream values. The REMP will be finalised in the post-EIS phase of the Project based on feedback from the Department, and implemented in accordance with the conditions of an EA.

3.6.2.20 Comment 20

TOR Category or EIS Chapter	Groundwater;	Submitters Reference to EIS Section (if provided)	Chapter 10, Groundwater Section 10.8, Mitigation Measures
Submitters Reference (if provided)	Comment 3; Table 2; 32.8		

Details of the Submission

Examples where stream flows have been supplemented to maintain aquatic ecosystems and riparian vegetation were provided (See page 15-135). The amended EIS should describe the similarity or otherwise of these examples, their effectiveness, any learnings, and how it would apply to the proposed project.

The amended EIS states that mine produced water would be used to supplement environmental flows. The specific bore information and an assessment of water quality suitability was not provided. There was no linkage to the ecological requirements for aquatic species and GDEs.

Suggested Solutions, Recommendations and Conditions

Provide a detailed analysis of the examples of supplementary water. This information should address the relevance of these examples to the proposed project; and the overall effectiveness of these examples in achieving the objective of reducing and/or eliminating potential environmental impacts.

Describe how the supplementary water mitigation measure would be undertaken to demonstrate it would achieve its intended purpose.

Provide further information and a detailed assessment of the suitability of using mine produced water.

Provide details on the timing volumes and relationship to watering requirements for key species and ecosystem functions. This should include, but not be limited to, an aquatic food web analysis to show the potential impacts on the hyporheic zone; consumer's energy requirements and whether they obtain resources from autotrophic and/or detrital pathways (that may be limited by the impact); the relative importance of inorganic Carbon-rich groundwater; and how biota inhabiting pools will adapt to the loss of connectivity and changes in water quality.

Proponent Response

An assessment of the hydrological impacts of the Project on Aquatic and Terrestrial GDEs has been completed by ELA (Aquatic & Marine Ecology, GDE and GBR Impact Assessment, Appendix A10a). Section 6 of the Report addresses potential impacts on Aquatic GDEs and Section 7 addresses potential impacts on aquatic ecology values. These assessments are informed by a significant revision of the Project description since the previously submitted SEIS, the results of a new regional groundwater model (Groundwater Model and Assessment Report, Appendix A6b) and the results of a new surface water model (Flood Study and Water Balance, Appendix A5b). Combined with a new Surface Water/Groundwater Interactions Report (Appendix A6d), and revised conceptualisation as summarised in Sections 10.3.7 and 10.3.8 in Chapter 10 – Groundwater, the assessment has demonstrated that widespread impacts requiring supplemental watering will not occur. In particular, the ephemeral nature of the creeks and the current flow regimes will remain unchanged, and connectivity along the creek systems for aquatic fauna will not be affected. In-stream works at

infrastructure crossings will be constructed in accordance with DAF standards to facilitate fish passage.

As such, supplementing streamflow by releasing mine water during dry conditions is no longer proposed as part of the Project

3.6.2.21 Comment 21

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Chapter 10, Groundwater Section 10.8, Mitigation Measures
Submitters Reference (if provided)	Comment 4; Table 2, 32.8		

Details of the Submission

The pools water balance model equation calculated a reference (baseline) condition (pre-mining) that is not adequate. The EIS used the evaporation rate calculated on a surface area of 4,060m^2 and a 1m depth level. Using only one sample on one pool does not accord with acceptable scientific protocols around sample size /effort, and lowers the confidence in the conclusions drawn.

The equation for the operational phase should account for the loss of groundwater pressure. The current model assumption is that the area of pool and depth of pool would remain constant despite the drawdown reduction of 2m and loss of baseflow (in the order of >40-60%).

The EIS does not discuss the high likelihood that the provision of supplementary water would drain through the alluvium to the new (reduced) height of the water table (estimated to be ~2m below ground level) and therefore not top up the pool to the same extent of area or restore it to its average depth. Whether the same dimensioned pool persists, or a smaller and shallower pool, or none at all would require analysis from a qualified hydrologist based on site field studies incorporating seasonal differences in groundwater quantity.

Suggested Solutions, Recommendations and Conditions

The amended EIS should include a more robust pools water balance model that includes multiple sampling over different seasons for all identified pools.

The baseline pools assessment should identify the number of pools that may be subject to drawdown, including, but not limited to: their dimensions; their location; their in-stream aquatic habitat features; their longevity in the dry season; their likely surface water and groundwater connectivity and threshold dependency on groundwater in the dry season/drought cycle.

Specific analysis is required to account for operational phase impacts. The assessment must be undertaken by a suitably qualified person with hydrology / GDE ecology expertise.

Proponent Response

Additional data has been collected since the SEIS v2, including continuous water level and EC in the Tooloombah Creek stream gauge site, twice-daily water level and EC in three other pools (one in Tooloombah Creek and two in Deep Creek), and additional monitoring of other sites and pools, including EC and descriptive data on pool availability. Using this data, WRM (in the Flood Study and Water Balance, Appendix A5b) and ELA (in the Surface Water/Groundwater Interactions Report, Appendix A6d) undertook modelling of these pools to determine whether evapoconcentration

alone, or additional external water, was required to explain their persistence and EC levels, particularly where EC levels can be seen to increase over time.

The assessment by WRM showed that the stream gauge pool currently receives a small, saline inflow that is independent of rainfall. If the Project causes this inflow to cease, this persistent pool may become ephemeral, drying out for about 5% of the time before being refilled by surface runoff. In that scenario, the water quality of the pool will likely become more fresh due to the absence of a saline groundwater inflow.

Assessments by ELA showed that another pool - the To2 permanent pool - also requires an external water source to explain its persistence, however this pool did not continuously increase in EC like the Tooloombah Creek stream gauge pool, lasting for approximately the same amount of time that bank storage return flows are predicted to occur. Data for other pools (including other sites in Tooloombah Creek, and all sites investigated within Deep Creek) indicate that EC levels can be explained by evapoconcentration alone. The overall assessment, including additional summary and justification using different data sources in Section 10.3.7 in Chapter 10 - Groundwater, concluded that that the creeks are primarily bank flow fed, rather than from elevated water table aquifers. However, the report concluded that the saline influence in the two abovementioned pools could be saturation of these sediments from rising regional saline water tables in the wet season, but that the stream gauge pool may potentially receive direct groundwater inflows during the dry season, at least for part of the time. The work identified a higher bank storage and return flux in Tooloombah Creek compared to Deep Creek.

The pools modelling was conducted by both WRM and ELA, both experienced and qualified hydrologists and aquatic ecologists, with ELA in particular having specific GDE ecology expertise. The distribution of pools and their persistence, as well as an assessment of impacts on the pools' persistence and flow on effects to aquatic ecosystems and habitats was conducted by ELA, and is presented in the Aquatic and Marine Ecology, GDE and GBR Impact Assessment (Appendix A10a). There are approximately 30 pools that have been mapped across the Study area within Tooloombah Creek, Deep Creek and associated tributaries. Some of these pools are permanent, supported by groundwater inputs (primarily bank storage return flows), while the majority are thought to be ephemeral, drying at varying stages of the climatic cycle (dry season), or during periods of prolonged drought.

Potential impacts of the Project on each pool will vary, as a function of the pool size (length, width and depth), habitat features and types of fauna it supports, amount of groundwater drawdown predicted to occur in that particular location, local geology and permeability of alluvial sediments to water, and the degree to which groundwater currently supports the pool under baseline conditions. Based on the results of surface water and groundwater modelling, the impact assessment concluded that some pools will be unaffected by the Project, while other ephemeral pools are likely to dry up faster than they do under existing baseline conditions. Permanent pools were only predicted to become ephemeral if there was enhanced leakage of water from the system as a result of groundwater drawdown (WRM 2020, Appendix A5b). This was assessed to be much less likely at Tooloombah Creek, where the permanent pools occur, than at Deep Creek, due to the lower permeability of creek sediments in Tooloombah Creek. However, Deep Creek also has much less reliance on groundwater with a much lower bank storage return flow, and pools are typically ephemeral, as demonstrated by monitoring data and observations.

Importantly, the Project is not expected to result in any major changes to the natural hydrological conditions of Tooloombah and Deep creeks. While some runoff within the creek catchments will be captured and retained on site within the mine footprint, the amount of water involved is minimal compared with that entering the creeks as runoff from the broader catchment (WRM 2020, Appendix A5b). In this regard, the ephemeral nature of the creeks and the current flow regimes will remain unchanged, and connectivity along the creek systems for aquatic fauna will not be affected. In stream works at infrastructure crossings will be constructed in accordance with relevant standards of the DAF to facilitate fish passage. Pools experience a natural cycle of drying under existing baseline conditions, and the aquatic ecosystem is adapted to these cycles.

3.6.2.22 Comment 22

TOR Category or EIS Chapter	Land; Rehabilitation and Decommissioning; Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Chapter 11, Pre-mining land use
Submitters Reference (if provided)	Comment 1; Table 3		

Details of the Submission

Section 5.4.4.1 'Land Use Suitability' and Section 5.4.4.2 'Good Quality Agricultural Land' identify the appropriate agricultural land suitability index to determine pre-mining land condition, however, section 5.5.5.1 'Past and Existing Land Uses' and 5.5.5.2 'Good Quality Agricultural Land' does not specify the pre-mining land suitability (i.e. Class 1 – Class 5). The pre-mining land suitability must be determined ensure the post-mining land use is not of significantly less value.

Suggested Solutions, Recommendations and Conditions

Complete a Land suitability assessment in line with the LSAT Guidelines within the Technical Guidelines for Environmental Management of Exploration and Mining in Queensland (DME, 1995); and an assessment of Good quality agricultural land using the Agricultural Land Classes nominated in the Planning Guideline: The Identification of Good Quality Agricultural Land (1993) to ensure the pre-mining land conditions are adequately identified.

Proponent Response

A Land Suitability Assessment has been prepared (Appendix A3a), based on data collected in 2012, and supplemented by data collected as part of the previous SEIS v2. This included detailed assessment of the soils encountered, and mapping of soil units, agricultural land classes and recommended stripping depths.

Mapping and description of the existing soil units and agricultural land classes (ALCs), including identification of existing ALC Class A and B land (which essentially replaces the previous Good Quality Agricultural Land requirements, now a Queensland State Planning Policy agricultural state interest), is provided in Sections 5.3.4.2 and 5.3.5 of Chapter 5 – Land (refer Figure 5-8), with the correspondence between land classes and ALC provided in Table 5-2 in that chapter. Figure 5-27 provides a plan showing the ALC Classes to be disturbed by the Project.

3.6.2.23 Comment 23

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Chapter 11, Section 11.13 & Table 11-15, Post- mining land use
Submitters Reference (if provided)	Comment 2; Table 3		

Details of the Submission

The amended EIS does not state or commit to a post-mining land use. Table 11-15 states the following uses as rehabilitation objectives:

- Mine – Open pits – Natural vegetation and habitat
- Waste rock stockpiles– Natural vegetation and habitat
- Mine infrastructure - n/a
- Water infrastructure (dams and drains) – to rehabilitate and return area to nature conservation usage.
- Haul road corridor – Revegetation and reconnection of wildlife corridor in previously RE areas
- TLF – Natural vegetation and habitat

However, no justification has been provided as to why this would be the best possible post mining land use or how it would be achieved. Indicators of success and completion criteria are not provided.

Suggested Solutions, Recommendations and Conditions

While a thorough assessment of rehabilitation objectives and outcomes would be required during the development of the Progressive Rehabilitation and Closure Plan (PRCP), the proposed project should not solely rely on this process to do so. In addition, the department is not satisfied with the assessment of the proposed post mining land use, objectives and outcomes (as proposed in the proposed EA conditions, Chapter 23) to allow them to be committed to within the EA conditions.

It is recommended this assessment be included in a Rehabilitation Management Plan, and rehabilitation requirements updated after the submission and approval by the administering authority. Update Draft EA Chapter accordingly (e.g. H8).

Proponent Response

Chapter 11 – Rehabilitation and Decommissioning has been completely revised for this SEIS and presents the rehabilitation and closure strategy for the Project, including an assessment and description of soil management and rehabilitation methods, a description of the planned progressive rehabilitation and revegetation of areas across the mine site and rehabilitation monitoring and maintenance requirements. Importantly, the post-mining landuse has been revised to grazing, supporting the reinstatement of the existing predominant landuse on the site.

A PRCP was not required as part of the ToR for the Project. However, in light of the recent commencement of the new financial provisions and rehabilitation requirements, this SEIS includes information which is typically required for inclusion within a PRCP. A formal PRCP will be developed at a later date based on the objectives and goals presented within this SEIS which seek to provide predetermined land uses for the different land units (domains) of the mine (see Section 11.11 of Chapter 11.

The strategy presented in Chapter 11, to be incorporated into the EA and the PRCP, will be finalised and require approval prior to the commencement of mining operations. Specific rehabilitation and decommissioning measures to avoid or minimise any impacts will be identified and the PRCP will be reviewed and updated during the mining life. The PRCP will be continuously updated during operations to ensure closure matters are appropriately addressed prior to the commencement of mine closure activities.

Schedule H of the Draft EA includes provisions to develop a rehabilitation plan (in line with similar resource EAs).

3.6.2.24 Comment 24

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.2.1.1 Chapter 11 Page 3 Mineral and Energy Resources Financial Provisioning bill
Submitters Reference (if provided)	Comment 3; Table 3		

Details of the Submission

This section states that the "new requirements for financial assurance and rehabilitation for resource activities is expected to commence on July 1 2019." Updated advice would suggest this isn't the confirmed date of commencement.

Suggested Solutions, Recommendations and Conditions

Update the amended EIS to reflect current advice. It is recommended wording such as "second half/later part of 2019" be included if a specific date cannot be confirmed.

Proponent Response

Section 11.1.3.1.1 'Mineral and Energy Resources (Financial Provisioning) Bill 2018' has been updated to reflect the actual date. Section 11.1.3.1.1 states "The new requirements for financial assurance and rehabilitation for resources activities commenced on 1 November 2019'.

3.6.2.25 Comment 25

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.5 Chapter 11 Page 5 Current and Post Mining Land Use
Submitters Reference (if provided)	Comment 4; Table 3		

Details of the Submission

This section states that land would be rehabilitated to meet "conservation objectives". However, the preceding paragraph on current land use does not suggest any current conservation value.

Suggested Solutions, Recommendations and Conditions

Describe the proposed conservation objectives and provide a justification of why these conservation objectives are suitable for land that has traditionally been used for grazing cattle.

Proponent Response

CQC has revised its rehabilitation and decommissioning strategy and no longer proposes to rehabilitate the Project site in order to meet conservation objectives. Importantly, the post-mining

landuse has been revised to grazing, supporting the reinstatement of the existing predominant landuse on the site.

As detailed in Chapter 11 – Rehabilitation and Decommissioning, as part of this SEIS v3, additional detailed mine scheduling, rehabilitation planning and final landform assessment and design work has been undertaken, in particular development of final landforms to support a post mining low intensity cattle grazing landuse.

CQC intends to manage its operations and conduct decommissioning and rehabilitation activities to ensure that the land disturbed is returned to land suitable for low intensity cattle grazing activities following the completion of mining operations. A small section of the Mamelon property, located at the southern extent of the ML boundary, will continue to be set aside for grazing.

As such, the decommissioning and rehabilitation objectives, indicators and completion criteria have been updated to better support the proposed post mining low intensity grazing landuse. This has been based on the revised landform design, updated rehabilitation scheduling and works on geochemistry, soils, and the updated rehabilitation strategy.

3.6.2.26 Comment 26

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Chapter 11 – Rehabilitation & Draft EA Conditions
Submitters Reference (if provided)	Comment 5; Table 3		

Details of the Submission

The amended EIS does not provide the maximum final heights and slopes of waste rock stockpiles 1 & 2.

Suggested Solutions, Recommendations and Conditions

Using the information provided in Chapters 5, 8 and 11, and the associated appendices, justify the maximum final heights and slopes of the rehabilitated waste rock stockpiles, and provide an impact assessment of the potential direct and indirect impacts to environmental values. This information is required to be determined, assessed and approved by the department.

Proponent Response

Chapter 11 – Rehabilitation and Decommissioning has been completely revised for this SEIS and presents the rehabilitation and closure strategy for the Project, including an assessment and description of soil management and rehabilitation methods, a description of the planned progressive rehabilitation and revegetation of areas across the mine site, and rehabilitation, monitoring and maintenance requirements.

As explained in Chapter 11, the mine plan has been optimised to specifically ensure that no voids will be retained within the landform at mine closure. Consequently, waste rock materials and mining schedules have been updated from those originally reported within the EIS. The Project mine plan has been further revised as part of this SEIS (v3) and now entails the establishment of two waste rock stockpiles: Waste Rock Stockpile 1, which services Open Cut 1 and Waste Rock Stockpile 2, which services Open Cut 2.

The location of the waste rock stockpiles has been determined considering the presence and location of sensitive environmental receptors, including Deep Creek and Tooloombah Creek and the

floodplain area. The locations for each waste rock stockpile have also been selected to maximise the use of already disturbed land to minimise the clearance of remnant vegetation, as much as is practicable, whilst considering the stability and safety of the stockpiles.

Whilst having regard for these surface footprint constraints, the waste rock stockpiles have been redesigned to maximise the temporary storage of waste rock extracted from the initial open cut operations. The construction of these waste rock stockpiles will generally be initially constructed with outer slopes of up to 1 in 3 (approximately 18 degrees) which will be shaped and temporarily rehabilitated. The exception is an area on the western side of waste rock stockpile 2, which will be shaped and rehabilitated to the final landform design in Project Year 4. This rehabilitated area will be subject to ongoing landform stability monitoring and testing from which the final landform design will be refined and updated accordingly.

Waste Rock Stockpile 1 will initially be developed up to RL 150 m and be reformed to a maximum final landform height of RL 100 m upon the completion of closure operations. Waste Rock Stockpile 2 will initially be developed up to a maximum landform height of RL 170 m and will be reformed to a landform height of approximately RL 100 m at mine closure.

At the completion of mining operations, materials stored within these waste rock stockpiles will be extracted and used for backfilling the completed open cut pits. Remaining waste rock materials will be reprofiled, topsoiled and rehabilitated to the final landform design.

Temporary rehabilitation of the waste rock stockpiles will aim to stabilise the waste rock materials stored within the temporary landform whilst assisting with the management of water runoff to avoid pollution to neighbouring waterways. The final landform design will be refined throughout the mine life to ensure that the landform established will be stable, safe and support the intended final land use (i.e. low intensity cattle grazing) for the Project area.

It is estimated that approximately 740 Mbcm will report to the two ex-pit waste rock stockpiles and two open cut pits throughout the mine life. The updated waste schedule is discussed in detail in Chapter 8 – Waste Rock and Rejects. The size of the final area occupied by Waste Rock Stockpile 2 (servicing Open Cut 2) and Waste Rock Stockpile 1 (servicing Open Cut 1) will be 287 ha (including over-pit areas totalling 211 ha) and 134 ha respectively.

Geotechnical, climate, surface water and groundwater monitoring throughout the construction and operation of the Project will be used to evaluate the condition of the waste rock stockpiles and refine the current understanding of their environmental risks. This information will then be used to determine any refinements required in preparation for final rehabilitation and closure.

The stability of the waste rock stockpiles will be monitored and reassessed based on the nature of: foundation materials, fill materials, and capping materials. The reassessments will consider short-term, long-term and extreme conditions and be implemented in accordance with the requirements of the Assessment and Management of Acid Drainage guideline of the Technical Guidelines for the Environmental Management of Exploration and Mining in Queensland series (DME 1995).

Deep infiltration of surface water flows into the final rehabilitated waste rock stockpiles will be minimised by compacting surface waste rock materials and if required capping using a low permeability material (i.e. clay) which is recovered from the mining area.

Final landform slopes will be shaped down to have slopes less than 7 degrees. Contour grooving, channel linings, surface armour and drop structures will be constructed on the outer slopes to prevent long watercourse runs and minimise slope erosion. Certification will be obtained to

demonstrate that slopes are stable in the long-term and erosion rates are no greater than at comparable reference sites. To assist with achieving this rehabilitation objective, soil materials with low sodic values (either naturally or after treatment) will be stockpiled separately and used in the final stages of waste rock stockpile rehabilitation.

All dams receiving runoff from the waste rock stockpiles will be remediated at the completion of mining as part of final mine closure activities, when rehabilitated areas have been stabilised. Water quality within each dam will be assessed against the relevant water quality guidelines in place at the time of closure. Where water quality characteristics allow, water from the dams will be used as part of final rehabilitation and closure activities. Where water quality characteristics prevent re-use, the water will be treated to a quality suitable for use as part of final remediation and closure.

It is not expected that any water from the dams will be released to either Deep or Tooloombah Creek during the final rehabilitation period as water will be required for the rehabilitation activities. Should there be a reason for a release during final rehabilitation and closure activities, the water quality will be assessed and released in accordance with the EA release triggers values in place at the time. Where water quality does not comply with release trigger values it will be treated to a compliant water quality and then released in accordance with the relevant EA conditions.

The final landform waste rock stockpiles will necessarily result in a higher landform than that which existed before mining. However, it should be noted that the neighbouring landforms (particularly those to the south of the ML) are already hilly and the waste rock stockpiles will generally be consistent with the surroundings.

Topsoil will be re-spread according to required depths and vegetation sown to establish cover comparable to reference sites. Soil characteristics will be measured *in situ* to confirm levels of surface roughness, aggregate stability and surface conditions as defined in the Australian Soil and Land Survey Handbook.

Vegetation cover will be provided to not only assist with erosion control but to provide for the regeneration of pasture land, suited to low intensity cattle grazing operations. Vegetation completion criteria will be measured based on achieving at least 70% cover as required by Eyre et al. (2015).

Flood modelling was revised for the Project, and an assessment of post mining flood impacts undertaken (see Appendix A5b), and the post closure drainage over the site has been specified, subject to detailed design.

The strategy presented in Chapter 11 will be incorporated into the EA and the PRCP will be finalised and require approval prior to the commencement of mining operations. Specific rehabilitation and decommissioning measures to avoid or minimise any impacts will be identified and the PRCP will be reviewed and updated during the mining life. The PRCP will be continuously updated during operations to ensure closure matters are appropriately addressed prior to the commencement of mine closure activities.

Overall, rehabilitation will occur progressively throughout the life of the Project, including the development of trial rehabilitation areas early in the mine life to ensure long term rehabilitation activities will be successful. The final landform stability assessment conducted as part of this new body of work has identified the detailed assessment and design work to be undertaken prior to mining commencing which CQC has committed to, including development of a geo-environmental block model and detailed landform haulage schedule. It provides a detailed assessment and pathway

for forward works to ensure that final landforms are low maintenance and geotechnically stable commensurate with the agreed final land use. Overall, the work undertaken to support this revised chapter indicates that there should be no impediment to achieving a final landform that is safe, stable, and non-polluting.

3.6.2.27 Comment 27

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Section 14.12 Chapter 14 Pages: 112-144 Offsets
Submitters Reference (if provided)	Comment 6; Table 3		

Details of the Submission

It is stated in this section that offsets will occur on Mamelon Property, which is also the location of the proposed project, but outside of the Mining Lease ML80187 (14.12.5.1). Figure 15 depicts the location of the three proposed offset sites, and OMA 3 appears to be located within the boundary on ML80187. This information should be revised. It also appears in Figure 15 that no habitat quality assessment has occurred near OMA 3.

Suggested Solutions, Recommendations and Conditions

The EIS should clearly describe whether there is a proposed offset located on ML80187, which is the project ML. OMA 3 should be assessed for habitat quality if an offset is proposed.

Proponent Response

The Project offsets will not be located on the ML and the Project's offset strategy has been revised. CQC has prepared a Biodiversity Offset Strategy as part of SEIS v3 to outline how the Project's anticipated offset requirements will be acquitted and CQC's approach to delivering these offsets in accordance with the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and Queensland Environmental Offsets Policy (Version 1.8; DES 2020). The Biodiversity Offset Strategy is available in Appendix 11a.

3.6.2.28 Comment 28

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Section 14.12 Chapter 14 Pages: 112-144 Offsets
Submitters Reference (if provided)	Comment 8; Table 3		

Details of the Submission

This section indicates that weed mapping would occur after the proposed offset is confirmed. This assessment should be undertaken before the proposed offset is considered acceptable.

Suggested Solutions, Recommendations and Conditions

Perform weed mapping and include in final Offset Management Plan.

Proponent Response

Two offsets are proposed for the Project as described in the Project's Biodiversity Offset Strategy (see Appendix 11a) – Mamelon and [redacted] The majority of Project offsets will be located on

Mamelon. The suitability of these offset areas have been assessed in accordance with the requirements of the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020), with the outcomes of this assessment presented in detail in the Biodiversity Offset Strategy.

The Mamelon Offset Area Management Plan (OAMP) (see Appendix 11c) has been prepared to guide the ongoing management and monitoring of the offset area, thus satisfying obligations under the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020). Weed species richness and cover surveys of the Mamelon offset area were undertaken between September 2019 and May 2020. Mapping of the weed species richness and cover by regional ecosystem is presented in Figure 12 and Figure 13 in the Mamelon OAMP (Appendix 11c). Ongoing weed monitoring within the Mamelon offset area is outlined in Section 8.3 of the Mamelon OAMP. The offset area will be monitored for weeds, including an initial baseline survey in year 1. Ongoing weed surveys will be undertaken every two years, consisting of a survey during the dry season and a survey post-wet season.

The [redacted] OAMP (see Appendix 11d) has been prepared to guide the ongoing management and monitoring of the offset area, thus satisfying obligations under the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020). Due to COVID-19 travel restrictions the proposed weed surveys were unable to be completed. However, the [redacted] OAMP commits to a targeted weed survey to be undertaken in year 1 of the implementation of the OAMP. The proposed details for weed monitoring are described in Section 8.3 of the [redacted] OAMP (Appendix 11d).

3.6.2.29 Comment 29

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Section 14.12 Chapter 14 Pages: 112-144 Offsets
Submitters Reference (if provided)	Comment 9; Table 3		

Details of the Submission

This section states that the proposed offset property would have to undergo vegetation regeneration due to previous clearing to facilitate cattle grazing and the land can provide conservation benefits. Detailed information on the current state of the proposed offset area is required to ensure it is a suitable and acceptable offset area. Further details are required on what conservation values are proposed for the Mamelon Property.

Suggested Solutions, Recommendations and Conditions

The amended EIS should discuss the current state of the land on Mamelon Property in terms of land classification. Discuss what conservation values are proposed for Mamelon Property, why these are suitable considering the current use is cattle grazing, and how these conservation values would be achieved.

Proponent Response

The total proposed Mamelon offset area is approximately 2,803 ha in size. Section 6.2 of the Biodiversity Offset Strategy (Appendix 11a) describes the vegetation communities and suitable habitat for fauna species present in the areas of the Mamelon property set aside by CQC for conservation purposes. An OAMP has been prepared for Mamelon and is available in Appendix 11c.

As detailed in the Project's Biodiversity Offset Strategy and OAMP, the proposed Mamelon offset area will acquit the majority of the Project's MNES and MSES offset requirements, including:

- Greater glider (*Petauroides volans*) – MNES
- Koala (*Phascolarctos cinereus*) – MNES
- Squatter pigeon (southern) (*Geophaps scripta scripta*) – MNES
- Of concern RE 11.3.4 (BVG 16c)– MSES (partly acquit on Mamelon)
- Of concern RE 11.4.2 (BVG 17a) – MSES
- Watercourse RE 11.3.4 (BVG 16c) – MSES (partly acquit on Mamelon) and
- Watercourse RE 11.3.25 (BVG 16a) – MSES (partly acquit on Mamelon).

Within the wider landscape Mamelon is well connected to large remnant habitat patches to the west; remaining contiguous with an extensive tract of remnant vegetation, which includes Tooloombah Creek Conservation Park, immediately to the north-west of Mamelon. Habitat to the south and south-west of the property is relatively patchy but maintains connectivity to extensive habitat associated with Broadsound Range (located to the south and west). Broadsound Range is itself part of a State-wide ecological corridor mapped under the BPA, as are coastal lands to the north and east.

Field Surveys

Field assessments of terrestrial vegetation, flora and fauna of the Mamelon property were undertaken between 2011 and 2020. Between March 2011 to July 2018, the majority of surveys were restricted to the mining leases and immediate surrounds (i.e. adjacent to Deep Creek) associated with the Project, with surveys after this time extending to the balance of Mamelon.

Targeted spotlighting surveys conducted in October and November 2019 by Austecology and CO2 Australia confirmed the presence of greater glider in the offset area, including foraging and denning in a variety of trees including *Eucalyptus crebra*, *E. platyphylla* and *E. populnea*. At least 22 greater glider were observed in November 2019 along and adjacent to Deep Creek in the east of Mamelon, with additional individuals observed along Barrack Creek in Strathmuir to the east of Mamelon.

Targeted surveys conducted in October and November 2019 by Austecology and CO2 Australia confirmed the presence of no fewer than 18 koalas within the offset area; including one observed feeding within a *E. exserta* on the boundary between RE 11.11.1 and RE 11.5.8 in the north-west of the Mamelon offset area, others sheltering in *E. crebra* within an area of regrowth RE 11.4.2, with numerous records along alluvial watercourses on Mamelon (RE 11.3.25). Additional evidence of their presence was confirmed throughout Mamelon in the form of characteristic scats and scratches.

Surveys in October and November 2019 by Austecology and CO2 Australia also confirmed the presence of six squatter pigeon on Mamelon, within the offset area, with a total of 25 confirmed records from Mamelon and adjacent Strathmuir. A further 58 squatter pigeon records are known from targeted surveys on those properties since March 2011.

The complete results of field surveys within the offset area are presented in the Biodiversity Offset Strategy in Appendix 11 – Offsets.

Habitat Quality Scores

The results of the detailed field surveys on Mamelon between 2018 and 2020 in the proposed impact and offset areas were used to calculate the baseline habitat quality scores presented in the

Mamelon OAMP (Appendix 11). Habitat quality scores have been calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality (version 1.2; DEHP 2017; see Appendix B of the Biodiversity Offset Strategy in Appendix 11a for the offset habitat quality score method). This included an assessment, for each of the monitoring sites, of the following:

- Site condition
- Site context and
- Species habitat index.

Habitat quality scores were area-weighted (where relevant) to account for the various component REs/condition states (including their corresponding habitat quality scores) contributing to the habitat area for each of the impacted and offset matters.

Offsets Assessment Guides and Land Based Offsets Multiplier Calculator

Using the habitat quality scores, the Mamelon offset area has been assessed in accordance with the Commonwealth Government's offsets assessment guide to determine its suitability to acquit the Project's MNES offset requirements and accommodate the minimum offset area required to be secured for each MNES on Mamelon (greater glider, koala and squatter pigeon) (see Appendix D of the Biodiversity Offset Strategy in Appendix 11a). In addition, the Mamelon offset area has also been assessed in accordance with the Queensland Government's land-based offset multiplier calculator to determine its suitability to acquit the Project's MSES offset requirements.

Section 6.5 of the Biodiversity Offset Strategy (Appendix 11a) demonstrates how the offsets meets the key overarching requirements of the EPBC Act Environmental Offsets Policy and the Queensland Environmental Offsets Policy.

Offset Management and Protection

The offset area on Mamelon will be managed in accordance with the requirements of the Mamelon OAMP (Appendix 11c) to achieve a conservation outcome for these MNES and MSES.

The offset areas have been situated outside of the MLs, and any areas that may potentially be impacted by groundwater drawdown, to ensure the Project's activities do not adversely affect the offset areas. Potential indirect impacts associated with the Project, including impacts from dust generation, increased noise and increased traffic, are not considered to have a significant impact on the offset area and will be managed and monitored through the Project's EMP.

Interim performance targets and completion criteria to measure the progress towards, and achievement of, the conservation outcomes for the offset matters have been defined in Section 5 of the Mamelon OAMP (Appendix 11c). The Mamelon offset area is proposed to be protected by a Voluntary Declaration under section 19E and 19F of the *Vegetation Management Act 1999* (VM Act) and will be declared as an area of high nature conservation value. The Voluntary Declaration will be registered on the property's title and will be binding on current and future landowners.

3.6.2.30 Comment 30

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Table 17 Chapter 14 Pages 101-104
Submitters Reference (if provided)	Comment 10; Table 3		

Details of the Submission

This table states that no significant risks of residual impacts are expected regarding connectivity. However in the Qualitative Risk Assessment (Table 16) the residual risk level to habitat connectivity is scored as medium.

Suggested Solutions, Recommendations and Conditions

The amended EIS states risk assessment scored threats to habitat connectivity as a medium level threat. Justify why Table 17 states there are no significant residual risks.

Proponent Response

As detailed in Section 5 of the Biodiversity Offset Strategy, a significant residual impact assessment for connectivity was undertaken using the Queensland Government's Landscape Fragmentation and Connectivity (LFC) tool. The results of this assessment determined that any Project impact on connectivity areas was not significant on account of there being no significant reduction in core remnant at the local scale nor any significant change from core to non-core remnant at the site scale.

3.6.2.31 Comment 31

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Table 18 Chapter 14 Pages 110-111
Submitters Reference (if provided)	Comment 11; Table 3		

Details of the Submission

The information contained in this table is not consistent with information contained in Appendix A9a Terrestrial Fauna Assessment Reports 2011-2012. Particularly for the Squatter Pigeon and Greater Glider, the table appears to underestimate the impact of the project based on the information in the relevant appendix.

Suggested Solutions, Recommendations and Conditions

Table 18 should describe the impacts to Greater Glider and Squatter Pigeon habitat more thoroughly and justify why these impacts should not be regarded as significant.

Proponent Response

CQC has commissioned further detailed assessments in regard to both the greater glider and squatter pigeon, including additional surveys at Deep Creek in 2019 (see Appendix 9c). A revised impact assessment was then undertaken for these species and is presented in Chapter 14 – Terrestrial Ecology and Chapter 16 – MNES.

These assessments, together with the assessments presented in CDM Smith (2018), provide a comprehensive description of the known and potential habitat for both the greater glider and squatter pigeon (southern), including additional analysis of squatter pigeon habitat based on the habitat descriptions provided by the Commonwealth department to assist in assessing impact to breeding, foraging, and dispersal habitats for the squatter pigeon (DEE 2019). Habitat for greater glider and squatter pigeon (southern) within the Project Site and Near Surrounds is illustrated in Figure 3-11 and Figure 3-12, respectively.

Based on the additional surveys and habitat assessments undertaken since the submission of SEIS v2, Chapter 14 and Chapter 16 presents a revised assessment of the potential Project impacts on greater glider and squatter pigeon, and an assessment of the impacts against the significant impact criteria as required under the Significant Impact Guidelines 1.1 - Matters of National Environmental Significance (DE 2013).

In regard to greater glider, taking into account a range of mitigation and management measures to reduce the intensity of the potential impacts, it is concluded that Project activities will result in a significant residual impact to 281 ha of greater glider habitat. The MNES Significant Impact Guidelines 1.1 (DE 2013) for Vulnerable species closely aligns with the QEOP Significant Residual Impact Guidelines (DEHP 2014a) criteria for Vulnerable species listed under the NC Act. Therefore, an additional assessment for the QEOP guidelines has not been undertaken and it is assumed that the impact to greater glider habitat as a MSES is significant by virtue of being significant under the EPBC Act.

In regard to squatter pigeon, taking into account a range of mitigation and management measures to reduce the intensity of the potential impacts of the Project, it is concluded that Project activities will result in a significant residual impact to remnant habitat for squatter pigeon (southern) as the Project will adversely affect remnant habitat critical to the survival of the species. However, the scale of the impact on non-remnant habitat (grazed pasture), would not result in a significant impact to the squatter pigeon. In the context of the availability of similar non-remnant habitat across the surrounding area, the potential impact of the removal of non-remnant habitat is regarded as negligible. The squatter pigeon is also listed as Vulnerable under the NC Act. The MNES Significant Impact Guidelines 1.1 (DE 2013) for Vulnerable species closely aligns with the QEOP Significant Residual Impact Guidelines (DEHP 2014a) criteria for Vulnerable species listed under the NC Act. Therefore, an additional assessment for the QEOP guidelines has not been undertaken and it is assumed that the impact to squatter pigeon remnant habitat as a MSES is significant by virtue of being significant under the EPBC Act.

The complete revised impact assessment for greater glider is presented in Section 14.6.5.1.1 of Chapter 14, and Section 16.10.3.1.1 of Chapter 16. The revised impact assessment for squatter pigeon is presented in Section 14.6.5.1.4 of Chapter 14, and Section 16.10.3.1.4 of Chapter 16.

CQC is committed to providing offsets to compensate for the Project's unavoidable direct and indirect significant residual impacts on greater glider and squatter pigeon. A Biodiversity Offset Strategy has been prepared to outline how the Project's offset requirements for greater glider and squatter pigeon will be acquitted in accordance with the EPBC Act Environmental Offsets Policy (DSEWPaC 2012). The Biodiversity Offset Strategy and the Project's Draft Offset Delivery Plan are presented in Appendix 11 – Offsets.

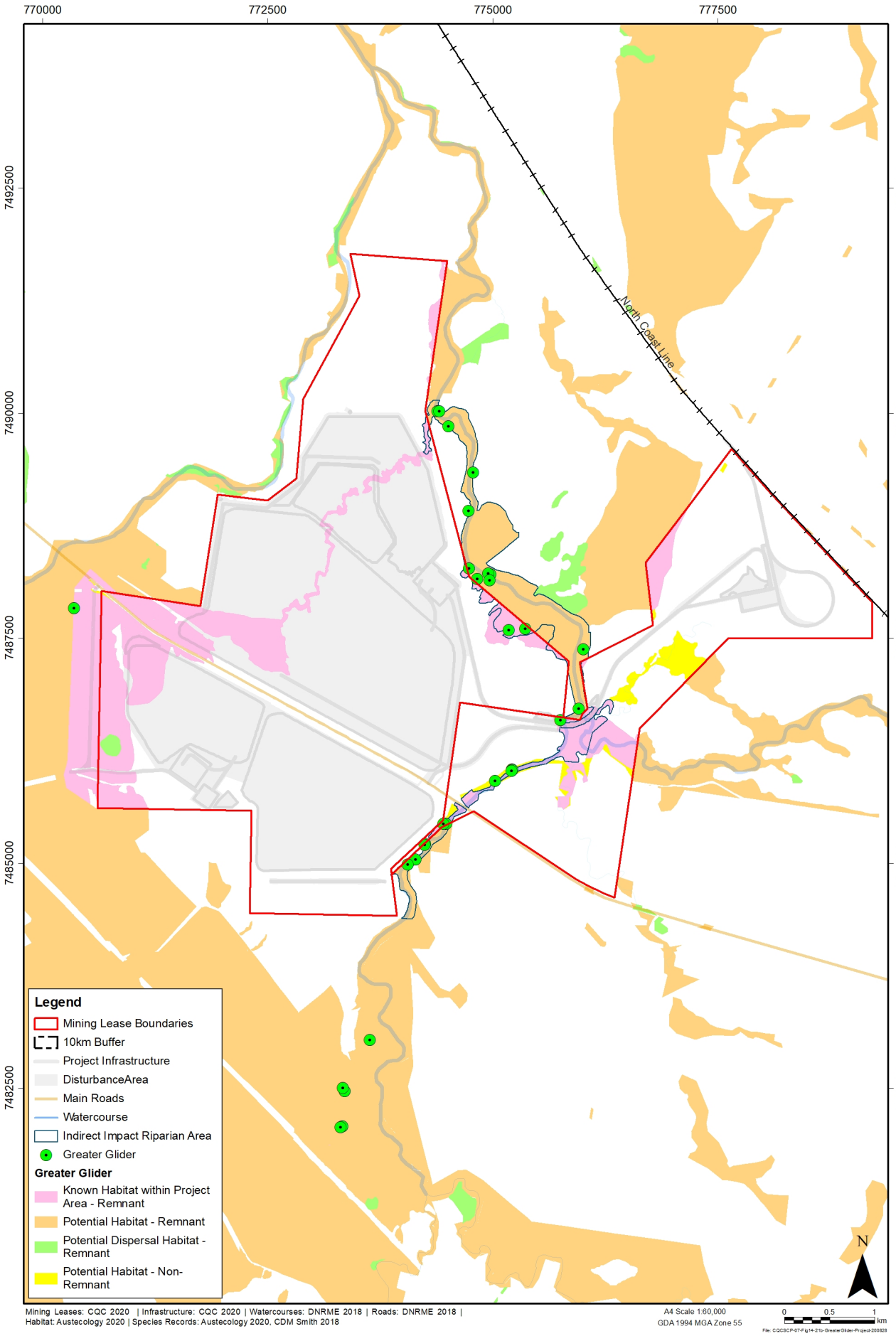


Figure 3-11: Greater glider habitat

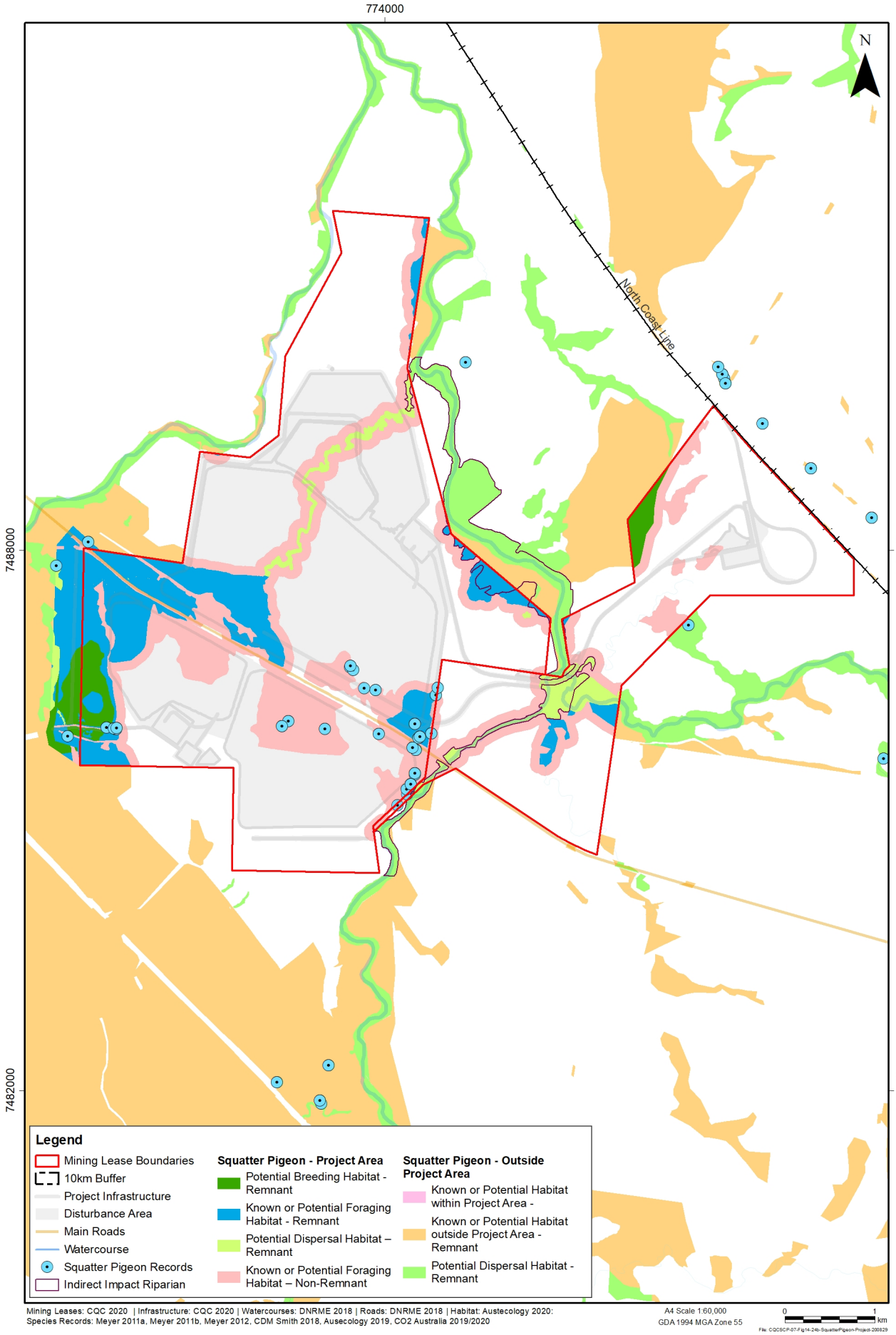


Figure 3-12: Squatter pigeon habitat

3.6.2.32 Comment 32

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 12; Table 3		

Details of the Submission

Proposed EA condition B3 "The holder of this EA must develop and implement coal spontaneous combustion management strategies and blasting management plans and submit to the administering authority for approval three months prior to the commencement of the project".

This proposed condition is for two different requirements and does not specify requirements.

Suggested Solutions, Recommendations and Conditions

Update Draft EA Chapter accordingly.

Proponent Response

The draft EA Chapter has been updated to more closely match the model mining conditions (DES 2017) and current EAs issued for other Projects, requiring the authority holder to develop and implement a blast monitoring program to monitor compliance with the blasting noise limits, rather than blasting management plans specifically required by the EA (although these will be prepared as part of the site management system).

Consistent with other similar EAs, a requirement for a Spontaneous Combustion Management Plan is included in the draft EA, specifying conditions.

3.6.2.33 Comment 33

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 13; Table 3		

Details of the Submission

Table 23-2 Noise limits does not reflect the noise limits outlined in the Noise Impact Assessment (i.e. it does not include limits for Sundays and public holidays, or the varied times required for these days).

Suggested Solutions, Recommendations and Conditions

Use the limits outlined in the amended EIS Noise Impact Assessment to update Table 23-2.

Proponent Response

Table 23-2 of Chapter 23 has been amended to reflect the applicable noise limits according to the MMC as presented in Table 13-4 of Chapter 13, Noise. The limits are reproduced below in Table 3-9.

Table 3-9: Site specific noise criteria for sensitive places as per the MMC methodology

Sensitive Receptor						
Noise level dB(A) measured as:	**Monday to Saturday**			**Sundays and Public Holidays**		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
$L_{Aeq, adj,15\ min}$	37	37	30	37	37	30
$L_{A01, adj,15\ min}$	42	42	35	42	42	35
Commercial Place						
Noise level dB(A) measured as:	**Monday to Saturday**			**Sundays and Public Holidays**		
	7am to 6pm	6pm to 10pm	10pm to 7am	9am to 6pm	6pm to 10pm	10pm to 9am
$L_{Aeq,adj,15\ min}$	42	42	35	42	42	35

3.6.2.34 Comment 34

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 14; Table 3		

Details of the Submission

Table 23-3 Blasting noise limits only prohibits blasting from 6pm to 6am, however, the noise management plan's mitigation measures recommends blasting only occur between 7am to 6pm.

Suggested Solutions, Recommendations and Conditions

Amend Table 23-3 Blasting noise limits to prohibit blasting between 6pm to 7am.

Proponent Response

Table 23-3 of the Draft EA has been amended to prohibit blasting between 6 pm to 7 am.

3.6.2.35 Comment 35

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 15; Table 3		

Details of the Submission

The only blasting noise limits specified in the noise impact assessment relates to the model mining condition limits, which require the following:

- Airblast overpressure
  - 115 dB (Linear) Peak for 9 out of 10 consecutive blasts initiated and not greater than 120 dB (Linear) Peak at any time
- Ground vibration peak particle velocity

- 5mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time

This is inconsistent with the limits proposed in the proposed draft EA Conditions.

Suggested Solutions, Recommendations and Conditions

Amend Table 23-3 Blasting noise limits to reflect the aforementioned limits, in line with the MMC & noise impact assessment.

Proponent Response

Table 23-3 of the Draft EA has been amended to reflect the aforementioned limits, in line with the model mining conditions and noise impact assessment. The MMC criteria for airblast overpressure and ground vibration are given below in Table 3-10.

Table 3-10: Airblast overpressure and ground vibration criteria

Blasting noise limits	7am to 6pm	6pm to 7am*
Airblast overpressure	115 dB (Linear) peak for 9 out of 10 consecutive blasts initiated and not greater than 120 dB (Linear) peak at any time	No blasting
Ground vibration peak particle velocity	5 mm/second peak particle velocity for 9 out of 10 consecutive blasts and not greater than 10 mm/second peak particle velocity at any time	No blasting

* Should blasting during these hours be required, approval will be sought from the appropriate Authorities, and will be covered by a specific Blast Management Plan.

3.6.2.36 Comment 36

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 16; Table 3		

Details of the Submission

Proposed EA condition D4 requires a blast monitoring program, however, does not specify when the program should be developed or implemented.

Suggested Solutions, Recommendations and Conditions

Specify a timeframe and include the requirement to implement the plan.

Proponent Response

Procedures to safely manage blasting will be articulated in a Blast Management and Monitoring Plan (BMP). All potential impacts associated with blasting activities will be assessed, and geotechnical and noise monitoring measures will be detailed. This Plan will be submitted to DES for review a minimum of three months prior to blasting. Note also that these procedures will be developed in conjunction with the Queensland Department of Transport and Main Roads (DTMR) to ensure that there will be no operational impacts to vehicles on the Bruce Highway due to blasting activities associated with the Project. The BMP will also be submitted to DTMR for their review at least three months prior to any blasting that may affect the Bruce Highway. See also response to Comment 5 from DTMR in Section 3.6.6.5, below.

3.6.2.37 Comment 37

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 17; Table 3		

Details of the Submission

Proposed condition D5 is superfluous as it is a requirement of Table 23-3.

Suggested Solutions, Recommendations and Conditions

It is recommended that proposed condition D5 be removed.

Proponent Response

Condition D5 of the Draft EA has been removed.

3.6.2.38 Comment 38

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 18; Table 3		

Details of the Submission

Proposed condition D6 does not align with the low frequency noise criteria outlined in the noise impact assessment.

Suggested Solutions, Recommendations and Conditions

Low frequency noise criteria to align with criteria used in noise impact assessment,

"Leq 57 (Lin) outdoors

Where the above limit is exceeded, the difference between dB(Lin) and dB(A) is less than 15 dB."

Proponent Response

The low frequency noise criteria in the revised noise impact assessment (see Chapter 13) is:

- Leq 55 (Lin) outdoors
- Leq 50 (Lin) indoors

Condition D6 of the Draft EA has been updated to align with these criteria and reflects the noise impact assessment for the Project.

3.6.2.39 Comment 39

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions/ Key Commitments
Submitters Reference (if provided)	Comment 19; Table 3		

Details of the Submission

Chapter 12 Key Commitment for Noise requires the implementation of a Noise Management Plan. Due to nearby sensitive receptors, and the current inaccuracy of noise modelling due to the change in mining sequence since noise modelling was completed, this commitment is to be reflected in the EA conditions.

Suggested Solutions, Recommendations and Conditions

Include requirement to develop a Noise Management Plan. Include timeframe and include the requirement to implement the plan.

Proponent Response

The Draft EA has been amended to include a requirement to develop a Noise Management Plan prior to commencement of construction.

3.6.2.40 Comment 40

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Section 23, Draft EA Conditions
Submitters Reference (if provided)	Comment 20; Table 3		

Details of the Submission

There are various reporting requirement throughout Schedule F of the proposed EA conditions. It is recommended the conditions require the submission of this information to the department's WaTERS database.

Suggested Solutions, Recommendations and Conditions

Ensure all conditions requiring water monitoring related data and reports include the requirement to submit to the department's WaTERS database.

Proponent Response

The relevant proposed EA conditions in the draft EA have been amended to include the requirement for all water monitoring related data and reports to be submitted to the department's WaTERS database.

3.6.2.41 Comment 41

TOR Category or EIS Chapter	Draft EA Conditions	Submitters Reference to EIS Section (if provided)	Draft EA Conditions, Schedule H, Table 23-14
Submitters Reference (if provided)	Comment 21; Table 3		

Details of the Submission

Progressive rehabilitation requirements in Table 23-14 of the proposed EA conditions are all "TBA", however, Figure 11-18 to Figure 11-20 (Chapter 11) outlines mapping demonstrating progressive rehabilitation for years 3, 6, 12, 18 & final landform.

Suggested Solutions, Recommendations and Conditions

It is recommended that either Table 23-14 of the proposed EA conditions is completed using the information provided in the amended EIS; or the Table is removed and progressive rehabilitation requirements are addressed in depth in the PRCP.

Proponent Response

As detailed in Chapter 11 – Rehabilitation and Decommissioning, as part of this SEIS v3, additional detailed mine scheduling, rehabilitation planning and final landform assessment and design work has been undertaken, in particular development of final landforms to support a post mining low intensity cattle grazing landuse. The post-mining indicators and completion criteria have also been updated to reflect this landuse (Section 11.11 of Chapter 11).

The strategy presented in Chapter 11 is intended to be incorporated into the EA and the PRCP. The strategy will be finalised and require approval prior to the commencement of mining operations. Specific rehabilitation and decommissioning measures to avoid or minimise any impacts will be identified and the PRCP will be reviewed and updated during the mining life. The PRCP will be continuously updated during operations to ensure closure matters are appropriately addressed prior to the commencement of mine closure activities.

As such, it is proposed for progressive rehabilitation requirements to be addressed in depth in the PRCP, and hence Table 23-14 has been removed from the Draft EA Conditions in Chapter 23.

3.6.2.42 Comment 42

TOR Category or EIS Chapter	Land; Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Appendix A4b Geotechnical Assessment
Submitters Reference (if provided)	Comment 22; Table 3		

Details of the Submission

There is a comment in this appendix that indicates that the safety factor for slopes is not adequate. This should be addressed in the "Land" Chapter.

Suggested Solutions, Recommendations and Conditions

The amended EIS should address the safety factor results in the Land chapter, justifying their suitability.

Proponent Response

The rehabilitation and closure strategy as well as final landforms and the mining schedule has been revised to support a post-mining grazing landuse, including a Land Stability Assessment (Appendix A3c). The assessment, including recommendations made and adopted by CQC and detailed in Chapters 8 (Waste Rock and Rejects) and 11 (Rehabilitation and Decommissioning) confirms that post-mining landforms will be stable.

The comment identified in this response relates to a modelled factor of safety applied to lowest strength parameters, which the Geotechnical Assessment report in Appendix 4b (Section 7.1.3) considered an unlikely scenario. Further investigations (including drilling work) and modelling assessments have been proposed and will be undertaken in consultation with the relevant parties as part of detailed design. Note that CQC have committed to preparing a geo-environmental block model of the pit area, to assist in developing a detailed haulage schedule and designing safe and stable final landforms. This will include geotechnical assessments to determine rock strength and durability.

3.6.2.43 Comment 43

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Appendix A9b Terrestrial Flora Report
Submitters Reference (if provided)	Comment 23; Table 3		

Details of the Submission

The maps contained in Appendix A and B of this report do not appear to highlight the current project site that is referred to throughout the EIS and other maps.

Suggested Solutions, Recommendations and Conditions

Clarify why these maps are included in the Appendix and how they related to the EPC1029 and the ML's and the location of activities on site.

Proponent Response

The flora survey presented in Appendix 9b of SEIS v2 was undertaken in 2011. The maps contained in Appendix A and B of the Terrestrial Flora report from 2011 reflect the survey effort at the time of that survey, which was EPC 1029. This was a broader survey area than the final Project Site presented in the SEIS v3. Refer to Chapter 14 – Terrestrial Ecology, Table 4-2 for a summary of all terrestrial ecology field survey events undertaken over the life of the Project including the survey extents.

3.6.2.44 Comment 44

TOR Category or EIS Chapter	Terrestrial Ecology; Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Appendix A18 Draft Offset Management Plan
Submitters Reference (if provided)	Comment 24; Table 3		

Details of the Submission

Part of the offset strategy involves rehabilitation of land that was previously cleared on the Mamelon Property. There are no defined rehabilitation objectives that indicate how the success of this rehab will be determined and whether this land would be deemed appropriate to constitute an offset area. Detail what rehabilitation activities would need to occur.

Suggested Solutions, Recommendations and Conditions

Define rehabilitation activities and objectives for success of the rehabilitation before the area is proposed as an offset.

Proponent Response

Management of the Mamelon offset area will be governed by the Mamelon OAMP as presented in Appendix 11c. The Mamelon OAMP has been prepared to guide the ongoing management and monitoring of the offset area and to satisfy obligations under the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the Queensland Environmental Offsets Policy (DES 2020). All details of the ongoing management, monitoring and reporting requirements in relation to the offset area, including objectives and performance outcomes to be obtained, are presented in the OAMP.

3.6.2.45 Comment 45

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Appendix A18 Draft Offset Management Plan
Submitters Reference (if provided)	Comment 25; Table 3		

Details of the Submission

The report states “CQC considers that with suitable management lands with a conservation benefit can be derived.” What is this based on?

Suggested Solutions, Recommendations and Conditions

Describe the kind of management needed to achieve this and what conservation benefits are expected.

Proponent Response

Draft OAMPs have been developed for all proposed offset areas (i.e. the Mamelon OAMP – see Appendix 11c and the [redacted] OAMP – see Appendix 11d). The overall aim of the Draft OAMPs is to improve the condition of MNES and MSES values within the offset areas. To achieve this, the OAMPs address the key threats to each MNES and MSES by implementing the recommended priority actions listed in recovery plans, threat abatement plans and conservation advices. The specific management actions to be undertaken in each offset area to address the threatening processes and achieve the stated conservation outcomes for MNES and MSES are detailed in Section 7 of the OAMPs.

3.6.2.46 Comment 46

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Appendix A18 Draft Offset Management Plan
Submitters Reference (if provided)	Comment 26; Table 3		

Details of the Submission

The amended EIS repeatedly states that offsets would occur on the Mamelon Property, which is also the location of the project, but outside of the Mining Lease ML80187 (5.1.1). Figure 5-3 and 5-4

depict the location of the three proposed offset sites, and OMA 3 appears to be located within the boundary on ML80187. This needs to be revised.

Suggested Solutions, Recommendations and Conditions

Clarify whether there is a proposed offset located on ML80187, which is the project ML.

Proponent Response

The proposed offsets for the Project will not be located within ML 80187.

As outlined in the Project's Biodiversity Offset Strategy (see Appendix 11a), the offset area on Mamelon is located outside the Project's two mining lease application areas (MLA 80187 and MLA 700022) on the Mamelon property. Similarly, the offset area on [redacted] is located outside of the two coal exploration permits ([redacted]) on the [redacted] property.

3.6.2.47 Comment 47

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Appendix A19 Vegetation Map Amendment
Submitters Reference (if provided)	Comment 27; Table 3		

Details of the Submission

The amended vegetation mapping depicts different regions of RE than what is depicted in other chapters. The RE should be mapped consistently in all chapters to avoid confusion.

Suggested Solutions, Recommendations and Conditions

Map the RE consistently in line with the amended vegetation mapping when necessary in relevant chapters.

Proponent Response

There was some inconsistency with the presentation of ground-truthed RE mapping in SEIS v2. This has been corrected throughout SEIS v3. Chapter 14, Figure 14-6, shows the extent of RE that has been ground-truthed within the Project Site and Near Surrounds, as well as the source of the data, and Figure 14-7 shows the ground-truthed RE as a result of these surveys.

Eleven REs were identified within the Project Site during field surveys and a total of 339 ha of remnant vegetation was mapped. Figure 14-6 and Figure 14-7 are replicated in Figure 3-8 and Figure 3-9, respectively. The ground-truthed RE mapping is now presented consistently throughout SEIS v3.

CQC submitted a vegetation map amendment request to DES in 2018 based on mapping undertaken by 3D Environmental in 2018. CQC has been advised by DES that the Herbarium accepted the majority of changes to the RE mapping as presented in the request. The only change that was not accepted was the inclusion of a small patch of RE 11.4.9 (0.5 ha). Due to its size, it is too small to map. CQC understands that Version 12 of the RE mapping containing the updates that relate to the map amendment request is due for release in December 2020.

The RE mapping presented in SEIS v3 is consistent with the mapping submitted to, and approved by the Herbarium in 2018, with the exception that the mapping presented in SEIS v3 still includes the small patch of RE 11.4.9 (0.5 ha) (i.e. this has not been removed of the purpose of this assessment).

3.6.2.48 Comment 48

TOR Category or EIS Chapter	Terrestrial Ecology	Submitters Reference to EIS Section (if provided)	Chapter 16 & Chapter 23
Submitters Reference (if provided)	Comment 28; Table 3		

Details of the Submission

The specific locations of MSES values have not been depicted. These are required to adequately identify the locations and boundaries of the MSES, and should be adopted in the EA conditions.

Suggested Solutions, Recommendations and Conditions

Supply shape files depicting the locations of MSES values which correlate with 'Table 23-17 Significant residual impacts to prescribed environmental matters' (proposed EA conditions).

Proponent Response

The location of MSES are depicted in the revised Chapter 14 – Terrestrial Ecology (see Section 14.3, and for a summary of the MSES applicable to the Project see Section 14.3.11). Table 14-17 of Chapter 14 summarises the MSES applicable to Project and references figures for relevant MSES. This table is replicated below in Table 3-11. The location of waterways mapped under the Waterway Barrier Works Fish Passage mapping layer is illustrated in Chapter 15 – Aquatic and Marine Ecology, Figure 15-5. Shapefiles depicting the location of MSES were submitted to the DES in the submission on 7-10-2020.

The impact assessment on MSES has been revised in SEIS v3. Significant residual impacts on MSES are identified in SEIS v3 Chapter 14 – Terrestrial Ecology (see Section 14.6.6) and Chapter 15 – Aquatic and Marine Ecology (see Section 15.6.7). A summary of the significant residual impacts on MSES is also summarised below in Table 3-11. CQC has prepared a Biodiversity Offset Strategy to guide the delivery of offsets for significant residual impacts on MSES. Relevant conditions of the Draft EA have been updated to reflect the revised impact assessment and offset requirements for MSES.

Table 3-11: Summary of MSES and applicability to the Project

Description	Project Applicability
MSES	
RE that are endangered or of concern	As illustrated in Figure 14 34, the Project Site and Near Surrounds includes the following four RE which are endangered or of concern: Of Concern RE 11.3.4, Of Concern RE 11.4.2, Endangered RE 11.3.11 and Endangered RE 11.4.9.
RE that intersect with an area shown as a wetland on the vegetation management wetlands map	As illustrated in Figure 14-35, the Project Site and Near Surrounds includes the following RE which intersect a wetland on the vegetation management wetlands map: Least Concern RE 11.3.27 and Least Concern RE 11.3.12.
RE that is an area of essential habitat for endangered or vulnerable plants or animals	As illustrated in Figure 14-20, the Project Site and Near Surrounds includes RE which are essential habitat for vulnerable animals including greater glider, koala, ornamental Snake and squatter pigeon.
RE located within a defined distance of a relevant watercourse	As illustrated in Figure 14-36, the Project Site and Near Surrounds includes the following RE located within a defined distance of a watercourse: RE 11.3.25, RE 11.3.4, RE 11.4.2 and RE 11.3.35.

Description	Project Applicability
RE that contains a connectivity area	The layout of the Project and its potential impact on connectivity were assessed using DES' 'Landscape Fragmentation and Connectivity' tool. The results of the assessment indicate no significant impact to connectivity is expected.
Designated precinct, in a strategic environmental area	The Project Site and Near Surrounds are not located within a strategic environmental area. The nearest strategic environmental area is located approximately 435 km to the south-east of the Project (Fraser Island).
Plants that are endangered or vulnerable under the NC Act	The Project Site does not intersect any area considered to be 'high risk' under the flora survey trigger mapping (Figure 14-16). An area mapped as 'high risk' occurs approximately 1 km directly north of the Project. No currently threatened flora species were recorded within the Study Area during field surveys.
A koala habitat area as defined under the Nature Conservation (Koala) Conservation Plan 2017, section 7B(1)	The Project will not result in a significant residual impact on koala habitat as defined under the Nature Conservation (Koala) Conservation Plan 2017, section 7B(1).
Habitat for an animal that is listed as endangered, vulnerable or special least concern as per the NC Act	As described in Section 14.3.9.5 the Project Site and Near Surrounds are known or likely to contain habitat for 11 species listed as either vulnerable or special least concern under the NC Act. As described in Section 14.3.9.6 the downstream environment is known or likely to contain habitat for 24 species listed as endangered, vulnerable or special least concern under the NC Act.
Any protected area under the NC Act	The nearest protected area to the Project Site is Tooloombah Creek Conservation Park located approximately 1 km to the east.
Any legally secured offset area	There are no legally secured offset areas located within the Project Site and Near Surrounds.
Waterway providing for fish passage	As illustrated in Figure 15-5 there are several watercourses of varying stream orders located within the Project area that have the potential to provide fish passage.

Table 3-12: Summary of significant residual impacts to MSES

MSES	Significant Residual Impact Conclusion	Significant Residual Impact Area (ha)		Offset to be Provided
RE that are endangered or of concern	The Project will result in a significant residual impact on Of Concern RE 11.3.4 and RE 11.4.2.	RE 11.3.4	40.7	Land based offset under QEOP
		RE 11.4.2	110.8	
RE that is an area of essential habitat for endangered or vulnerable plants or animals	The Project will result in a significant residual impact on prescribed RE that is essential habitat for the greater glider, koala and squatter pigeon.	Greater glider	15.0	Land based offset under EPBC Act Offset Policy
		Koala	110.4	
		Squatter pigeon	28.9	
RE located within a defined distance of a relevant watercourse	The Project will result in a significant residual impact on watercourse vegetation	RE 11.3.4	4.3	Land based offset under QEOP

MSES	Significant Residual Impact Conclusion	Significant Residual Impact Area (ha)		Offset to be Provided
	associated with RE 11.3.4 and 11.3.25.	RE 11.3.25	78.8	Combination of direct land-based offset and financial settlement offset under QEOP
Waterway providing for fish passage	The Project is expected to result in a significant residual impact to 8.35 ha of waterways providing fish passage.	Fish Passage	8.35	Financial settlement offset
Habitat for an animal that is listed as endangered, vulnerable or special least concern as per the NC Act	The Project will result in a significant residual impact on habitat for species listed as Vulnerable under the NC Act including greater glider, koala, squatter pigeon and ornamental snake.	Greater glider	281.0	Land based offset under EPBC Act Offset Policy
		Koala	324.6	
		Squatter pigeon	306.6	
		Ornamental snake	18.8	

3.6.3 Queensland Department of Natural Resources, Mines and Energy

3.6.3.1 Comment 1

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.2.1, Chapter 10, pages 10-2, Water Act 2000
Submitters Reference (if provided)	25.1		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 10, Section 10.2.1.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.2 Comment 2

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.6.3, Chapter 10, pages 10-48 to 10-51, Groundwater Quality Changes
Submitters Reference (if provided)	25.2		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Section 10.5, 10.7 and 10.8 and Appendix A6.

The SEIS has identified a low likelihood of ingress of the saltwater interface resulting from mining activities, as discussed in Section 10.7.4.6 (also addressed against submission reference 24.11).

Suggested Solutions, Recommendations and Conditions

This has been adequately addressed.

The worst case 0.1m contour is not predicted to extend past WMP29 so as to induce mobilisation of a saltwater interface. (Eg Fig 3-61 App A6)

Proponent Response

Noted. No response required.

Additional work undertaken as part of SEIS v3 furthers supports this submitter assertion that there will be unlikely to be a mobilisation of the saltwater-freshwater interface.

Section 10.3.6.6 of Chapter 10 – Groundwater, describes the closest extent of the fresh-seawater interface as being well beyond the influence of the Project, based on both theoretical and observational data.

The groundwater modelling has provided (in Figure 8-6, Attachment 3, in the SEISv3 Appendix A6a) groundwater flow directions in the Cainozoic/regolith and Styx Coal Measures layers for pre-mining, during operations, and post mining, showing that Project influence on groundwater flow directions diminishes to effectively nil at the Tooloombah – Deep Creek confluence, which is only 2.2km downstream of the Project, where the theoretical seawater interface surface would be below -280 mAHD, which is well beneath the predicted extent of drawdown. At the Ogmore bridge and WMP29 bore locations, both well outside the drawdown extent, and approximately 4km downstream of the Project, the theoretical fresh-seawater interface is still at least -40 to -80 mAHD. Any fresh-seawater interface at a shallower depth closer to the coast is well beyond the influence of the drawdown zone and any influence of the Project on groundwater flow direction.

The assessment of cumulative impacts, including impacts relating to the historic mine workings at Ogmore and Bowman (refer to the Groundwater Model and Assessment Report in Appendix A6b), concluded that the predictive cumulative modelling results demonstrate there is unlikely to be any superposition effects, thus, the predicted cumulative drawdown impacts at private landholder bores, springs, wetlands, Groundwater Dependent Ecosystems (GDEs), Broad Sound Declared Fish Habitat Area (FHA) and on recorded groundwater fauna locations / stygofauna habitat and riparian vegetation are equivalent to the Project alone.

Therefore, there is not expected to be any discernible change to the location of the fresh-seawater interface.

3.6.3.3 Comment 3

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.6.3, Chapter 10, pages 10-48 to 10-51, Groundwater Quality Changes Section 10.6.5, Chapter 10, page 1052, Groundwater- Surface water Interaction
Submitters Reference (if provided)	25.3		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Section 10.5, 10.6, 10.7 and Appendix A6.

Suggested Solutions, Recommendations and Conditions

The model is satisfactory to use to the predicted impacts. As noted in comment 25.9, the amended EIS states that the 'isotropic condition (Kh/Kv = 1 as adopted by the base case) offers a more conservative approach'.

Proponent Response

Noted. No response required.

Note – anisotropic conditions have been modelled in the coal seams, based on peer review comments and literature, finding that vertical hydraulic conductivity should be lower than horizontal hydraulic conductivity (in the coal seams). Based on the model improvements and peer review acceptance of the model, this does not represent a less conservative, but instead a more accurate, prediction of environmental effects.

3.6.3.4 Comment 4

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.6.4, Chapter 10, page 10-51, Pit water quality Section 4.1.4 Appendix A6, page 4-4, Final Mine-Pit voids
Submitters Reference (if provided)	25.4		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 3, Section 3.4.1.4. The mine plan has changed and there will be no final voids therefore this has been adequately addressed.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.5 Comment 5

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.7.3, Figure 10-20 Chapter 10, page 10-58 to 10-59
Submitters Reference (if provided)	25.5		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Sections 10.7 and Appendix A6.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.6 Comment 6

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.8.4, Chapter 10, page 10-72 to 10-74, Groundwater Monitoring
Submitters Reference (if provided)	25.6		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 10, Sections 10.5 and 10.8.

An additional 30 monitoring bores have been installed, up to depths of approximately 230mbgl, providing sufficient spatial coverage to monitor the drawdown likely to occur. The expanded existing monitoring network is shown on Figure 10- 33 and 10-102.

Drilling logs are provided for all Project monitoring bores, in Attachment 1 of Appendix A6, with interpretation of the hydrostratigraphic unit(s) encountered.

It is acknowledged in Section 10.5.6.1 that there are some bores in the monitoring network that screen the alluvial aquifer and partially penetrate the underlying aquitard unit, and the pressure response observed is associated with the aquifer (see Section 10.5.6.2).

Suggested Solutions, Recommendations and Conditions

This has been adequately addressed through the expansion of the monitoring bore network including some deeper bores (WMP22C, WMP23B, WMP29E, WMP30C). Although it is acknowledged that some bores tap two aquifers, this would need to be considered when analysing future data. It is noted that in some cases where a bore is tapping two aquifers, there are nearby

bores tapping a single aquifer. The bores may still provide some useful information in regards to the general water table.

Proponent Response

Noted. No response required.

Note that some additional bores have been installed, including targeting the alluvial aquifer close to creek areas, and the bores mentioned above have been subjected to ongoing monitoring, and so data is available. Also, bore logs are now provided in the Groundwater Quality Data Summary Report in Appendix A6c.

3.6.3.7 Comment 7

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.10.2, Chapter 10, page 10-82, Further work
Submitters Reference (if provided)	25.7		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Sections 10.5, 10.6, 10.7 and 10.8 and Appendix A6.

Also addressed in response to submission 25.6.

Suggested Solutions, Recommendations and Conditions

This issue has been adequately addressed. A number of additional monitoring bores (30) have been drilled during Sept- Nov 2018 including some deeper wells. Hydraulic testing has been undertaken on a total of 34 bores, producing localised field information. Borehole information has been provided in Appendix A6, Attachment A. See also comments on Comment 25.6.

Proponent Response

Noted. No response required.

Note that some additional bores have been installed, including targeting the alluvial aquifer close to creek areas, and the bores mentioned above have been subjected to ongoing monitoring, and so data is available. Also, bore logs are now provided in the Groundwater Quality Data Summary Report in Appendix A6c.

3.6.3.8 Comment 8

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 2.3.4, Appendix A6, page 2-9, Groundwater Recharge
Submitters Reference (if provided)	25.8		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Section 7 and Appendix A6.

Suggested Solutions, Recommendations and Conditions

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Section 7 and Appendix A6.

Proponent Response

Noted. No response required.

3.6.3.9 Comment 9

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 4.2.1 Appendix A6, pages 4-7, Predicted drawdown extent
Submitters Reference (if provided)	25.9		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Section 7 and Appendix A6.

Suggested Solutions, Recommendations and Conditions

While the response has not directly provided how or where this has been specifically addressed - i.e. reasoning why drawdown contours appear to be similar in each formation. DNRME notes that this effect may be due to low Kh/Kv ratio used for the Styx Coal measures where Kh is equal to Kv. (Table 34 Appendix 6) thus propagating greater impacts into overlying layers. It is noted that the drawdowns in the water table become less where the Kh/Kv ratio increases, as seen in Figure 3-65 (Appendix A6). The amended EIS states that the 'isotropic condition (Kh/Kv = 1 as adopted by the base case) offers a more conservative approach'. Therefore the model predictions can be considered adequate to be used to assess impacts on other users and associated GDEs.

Proponent Response

As discussed in the response to Comment 3 (Section 3.6.3.3), anisotropic conditions have been modelled in the coal seams, based on peer review comments and literature, finding that vertical hydraulic conductivity should be lower than horizontal hydraulic conductivity (in the coal seams). Based on the model improvements and peer review acceptance of the model, this does not represent a less conservative but instead a more accurate prediction of environmental effects.

3.6.3.10 Comment 10

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 4.3 Appendix A6, pages 4-11, Model Confidence and Uncertainty
Submitters Reference (if provided)	25.10		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Section 7 and Appendix A6.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. Note that additional model uncertainty analysis and sensitivity testing has been conducted. This is summarised in Section 10.5.5 of Chapter 10 – Groundwater, and detailed in the Groundwater Model and Assessment Report in Appendix A6b.

3.6.3.11 Comment 11

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Section 9.4.3, Chapter 9, page 9-11, Existing Waterways and Local Catchments
Submitters Reference (if provided)	25.11		

Details of the Submission

Noted
Appendix A21 – Waterway Assessment.

Suggested Solutions, Recommendations and Conditions

Appendix A21 – Waterway Assessment.

Proponent Response

Noted. No response required.

3.6.3.12 Comment 12

TOR Category or EIS Chapter	Project Approvals	Submitters Reference to EIS Section (if provided)	Appendice A1, page 3, Approval Notification – Use and take of surface water or ground water.
Submitters Reference (if provided)	25.12		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 3, Section 3.4.5

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.13 Comment 13

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Section 9.2.4, Chapter 9, page 9-3, Water Act 2000
Submitters Reference (if provided)	25.13		

Details of the Submission

Noted.

Addressed in Chapter 1, Section 1.11 and Chapter 9 – Surface Water and Chapter 10 -Groundwater.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.14 Comment 14

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 1.10.2.7, Chapter 1, page 1-35, Water Act 2000, Interfering with a Watercourse Section 1.10.8.2, Chapter 1, page 1-42, Guidelines Section 9.2.4, Chapter 9, page 9-3, Water Act 2000
Submitters Reference (if provided)	25.14		

Details of the Submission

Noted.

Addressed in Chapter 1, Section 1.11.7.2

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.15 Comment 15

TOR Category or EIS Chapter	Surface Water	Submitters Reference to EIS Section (if provided)	Section 9.4.6, Chapter 9, page 9-18, Existing Water Users
Submitters Reference (if provided)	25.15		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 9, Section 9.4.8 and Chapter 10, Sections 10.6.2 and 10.7.4.8 and Appendix A6 – Groundwater.

There are 4 bores located within the predicted drawdown area, however drawdown is predicted to be negligible at these locations A negligible adverse impact is expected to the operation of these bores.

Suggested Solutions, Recommendations and Conditions

This has been adequately addressed.

Predicted extent of impacts on groundwater users have been identified and mitigation measures outlined.
In relation to surface water, the Chapter 9, section 9.4.8 of the EIS notes a commitment that any reduction in water resource availability or quality because of the Project will be addressed by means of make good agreements that will be established with affected landholders. Water is not proposed to be directly taken from the creeks and retain surface flows by measures undertaken to prevent overland flows from entering the operational mine area.

Proponent Response

Noted. No response required.

Note that the revised assessment of groundwater and surface water retains make good arrangements, and catchment diversion drains are implemented to minimise overland flows entering the mine site. Determination of potential impacts to users identifies one groundwater bore that may potentially be impacted, with no impacts to surface water users.

3.6.3.16 Comment 16

TOR Category or EIS Chapter	Groundwater	Submitters Reference to EIS Section (if provided)	Section 10.5.10 Groundwater Flow System
Submitters Reference (if provided)	25.16		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Chapter 10, Section 10.5 and Appendix A6. A

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.17 Comment 17

TOR Category or EIS Chapter	Groundwater; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Section 10.5.13 Groundwater Dependent Ecosystems
Submitters Reference (if provided)	25.17		

Details of the Submission

This comment has been addressed in the SEIS.

This has been addressed in Sections 10.7, 10.8 and 10.9 The existing monitoring network has been expanded with the addition of 30 new monitoring bores (see Figure 10-18 and Figure 10-102), including monitoring bores located adjacent identified potential GDEs (see Table 1085).

The GDE monitoring program is outlined in Section 10.8.5 which will form part of the REMP.

Suggested Solutions, Recommendations and Conditions

This has been adequately addressed. (Table 10-85).

Proponent Response

Noted. No response required. Note that a Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP) has been prepared, provided in Appendix A10e, and a Draft Receiving Environment Monitoring Program, provided in Appendix A10f. The REMP covers surface waters only, and the GDEMMP covers the Groundwater Dependent Ecosystem monitoring program.

3.6.3.18 Comment 18

TOR Category or EIS Chapter	Groundwater; Aquatic Ecology	Submitters Reference to EIS Section (if provided)	Section 14.7.10 Groundwater Drawdown
Submitters Reference (if provided)	25.18		

Details of the Submission

Additional information has been provided in the SEIS.

Addressed in Chapter 14, Section 14.12.4, Table 14-21.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.19 Comment 19

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.16 ToR Cross-reference table (and elsewhere)
Submitters Reference (if provided)	25.19		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 4, Section 4.7, Chapter 9, Section 9.6 and Chapter 11, Section 11.11.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.20 Comment 20

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.11 Post-mining Indicators and Completion Criteria
Submitters Reference (if provided)	25.20		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 3, Section 3.4.1.4 and Chapter 11, Sections 11.11.1 and 11.11.9.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.21 Comment 21

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.7.1.2 Long Term Goals
Submitters Reference (if provided)	25.21		

Details of the Submission

This comment has been addressed in the SEIS.

Addressed in Chapter 5, Section 5.6.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.3.22 Comment 22

TOR Category or EIS Chapter	Rehabilitation and Decommissioning	Submitters Reference to EIS Section (if provided)	Section 11.9.10 Waste Rock Dumps
Submitters Reference (if provided)	25.22		

Details of the Submission

Noted.

Addressed in Chapter 11, Section 11.3.3.

Suggested Solutions, Recommendations and Conditions

Previously addressed by proponent.

Proponent Response

Noted. No response required.

3.6.4 Commonwealth Department of Agriculture, Water and Environment

3.6.4.1 Overview

The Department considers the nature of the proposed action and its location approximately eight kilometres from the Great Barrier Reef World Heritage Area, provide the potential for serious adverse impacts to the World Heritage area, Great Barrier Reef Marine Park, listed threatened and migratory species and their habitat.

Based on the information available in the amended EIS (AEIS), the Department considers the proponent has not adequately addressed the risks and potential impacts of the proposed action as identified by the Department in December 2017 and June 2018. The Department is therefore of the view that the AEIS is inadequate to allow the Minister to determine the acceptability of the impacts of the proposed action on relevant matters of national environmental significance (MNES under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Further detail is provided in Table 1 below.

3.6.4.2 Comment 1

TOR Category or EIS Chapter	Groundwater; MNES;	Submitters Reference to EIS Section (if provided)	Water resources – Groundwater Model Sections in AEIS: 16.11 and 16.14
Submitters Reference (if provided)	Comment 1 - Groundwater Model		

Details of the Submission

Not adequately addressed - Submission 21.

The Department has a low degree of confidence in the ability of the current groundwater model to adequately predict the likely direct and indirect impacts on MNES, both within the project site and downstream of the project site.

The limited time series data informing the model is not adequate to characterise the likely seasonal variations in groundwater levels and the model's ability to predict future variability. In particular:

- the current bore network is not spatially appropriate to understand the nature of the groundwater system
- the location of the seawater-freshwater interface has not been determined and is not considered by the model
- the bore monitoring timeframes are not sufficient to calibrate the model to a high level of accuracy
- long-term pump tests have not been undertaken to provide a high level of confidence in understanding the groundwater system in the wider area
- the model is constrained by data derived from only shallower aquifers and does not provide a full representation of the hydrogeology of the project site and surrounds
- the backfilled final voids have not been appropriately parameterised in regards to their hydraulic properties
- flood heights are not adequately represented in the model as there is no site-specific data on flooding events and long-term trends

- there is a high level of uncertainty on the nature and extent of surface water-groundwater connectivity within and downstream of the project site and
- the sensitivity and uncertainty analysis is not adequate given the high risks with the proposed action and its potential impacts on MNES.

The Department notes the outcomes of the groundwater model peer review have not been incorporated into mine planning and management.

Suggested Solutions, Recommendations and Conditions

Based on the information in the AEIS, the Department considers the proponent has not adequately responded to submission 21.

Proponent Response

3.6.4.2.1 Not adequately addressed - Submission 21.

Central Queensland Coal (CQC) note that submission 21 said:

Water Resources Assessment and response to the advice from the Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining Development (IESC).

The Department considers that the project has the potential to impact on water resources, particularly through:

- *changes to groundwater/surface water interactions from groundwater drawdown including the alteration of watercourse flow regimes and the loss of permanent discharge pools which may provide potential habitat for nationally listed aquatic species*
- *exposure of potential acid sulphate soils (PASS) in stream beds as a result of groundwater drawdown*
- *changes to water quality from mining operations and the release of mine-affected water into surface watercourses*
- *the disruption of aquifers and the alteration of the groundwater/salt water interface near the coast from groundwater drawdown*
- *the degradation and potential loss of ground-water dependent ecosystems (GDEs) along major watercourses due to groundwater depressurisation and the severing of base flow*
- *changes to surface water quality and surface water hydrological regimes as a result of extreme flooding events and*
- *changes to surface water and reef water quality from increased sediment and pollutants entering surface water systems.*

Recommendation

- *Include a detailed response to the IESC comments on the draft EIS in the supplementary EIS.*

CQC response

Due to the length of Submission 21, for ease of reference, the elements of concern have been split up into subsections which are repeated below, along with responses to each subsection:

The Department considers that the project has the potential to impact on water resources, particularly through:

- *changes to groundwater/surface water interactions from groundwater drawdown including the alteration of watercourse flow regimes and the loss of permanent discharge pools which may provide potential habitat for nationally listed aquatic species.*

This revised SEIS has assessed the potential for drawdown of groundwater to impact on GDEs, including an assessment of the extent, type and potential connectivity of GDEs in the Project area, (see Aquatic and Marine Ecology, GDE and Great Barrier Reef (GBR) Impact Assessment - Appendix A10a). This work was informed by the results of a new regional groundwater model (Appendix 6b) and the results of new flood and water balance modelling (Appendix 5b), as well as a study of interactions between surface waters and groundwater (Appendix 6d and summary in Section 10.3.7 of Chapter 10 - Groundwater).

The above work along with an assessment of monitoring data and lithology and groundwater level of creek cross sections near to the Project has concluded that essentially, direct drawdown impacts on the pools within both Deep and Tooloombah Creeks is unlikely, with potentially some changes to the persistence of limited areas. Data for one of the existing pools along Tooloombah Creek indicates that the pool currently receives a small, saline inflow that is independent of rainfall. If the Project causes this inflow to cease, some of the persistent pools along Tooloombah Creek may become ephemeral, drying out for about 5% of the time before being refilled by surface runoff. In that scenario, the pools will likely become more fresh due to the absence of a saline groundwater inflow. This is described in more detail in the response to the Queensland Department of Agriculture and Fisheries (DAF) Comment 1 (Section 3.6.1.3).

- *exposure of potential acid sulphate soils (PASS) in stream beds as a result of groundwater drawdown.*

Section 5.3.6 of Chapter 5 – Land provides a detailed assessment of the likelihood of acid sulfate soils (ASS), either actual (AASS) or potential (PASS) within the Project disturbance area and within the groundwater drawdown extent. Based on existing risk mapping, topographic levels in the area, and both geological, geomorphological and soils investigation results, the assessment concluded that there is no evidence for ASS in the area, and that there is no justification for detailed ASS investigations (based on Dear et al. 2014).

Note that due to existing ephemeral conditions in the waterways, stream beds are already exposed periodically (in Tooloombah Creek, pools become separated and dry sections appear, regardless of the persistence of some pools; Deep Creek is generally ephemeral along the entire reach investigated).

- *changes to water quality from mining operations and the release of mine-affected water into surface watercourses.*

A detailed assessment of water quality impacts to surface waters from the Project is provided in Section 9.6.5 of Chapter 9 – Surface Water, including a direct assessment of the impact of a selection of parameters potentially elevated in Mine Affected Water (MAW) on downstream receiving waters. This found that all parameters were well within the range of the typical historical receiving water concentrations, and as such, releases from the site water management system are predicted to have no impact on downstream water quality.

- *the disruption of aquifers and the alteration of the groundwater/salt water interface near the coast from groundwater drawdown.*

Section 10.5.1.5 of Chapter 10 – Groundwater addresses aquifer disruption, which results from intersection of the coal measures and alluvium over the pit areas. With the backfilling of the pits and final filling of all residual voids, the system will recover in the long term, and any disruption to the passage of water through these aquifers will disappear as water levels and pressures recover and stabilise. Regarding the groundwater-seawater interface, a detailed response has been provided in the response to Queensland DAF Comment 1 (see Section 3.6.1.1, above). Essentially, the Project will not cause a mobilisation of the groundwater-saltwater interface. This is also discussed in detail in Sections 10.3.6.7 and 10.5.3 of Chapter 10 – Groundwater.

- *the degradation and potential loss of ground-water dependent ecosystems (GDEs) along major watercourses due to groundwater depressurisation and the severing of base flow.*

An assessment of impacts on aquatic ecology values and GDEs has been completed (see Aquatic and Marine Ecology, GDE and GBR Impact Assessment in Appendix A10a). The assessment has been informed by several new technical studies, including a regional groundwater model (Groundwater Model and Assessment Report in Appendix A6b), modelling of surface water flows (Flood Study and Water Balance in Appendix A5b) and a study of the interactions between surface water and groundwater resources (Surface Water/Groundwater Interactions Report in Appendix A6d). Significant on-site drilling investigations within the alluvial corridor of Tooloombah Creek and Deep Creek have also been completed, to assist in improving the understanding of likely water movement within sediments of the alluvial corridor in response to predicted groundwater drawdown arising from the Project.

The collective studies described above found that baseflow forms a small part of overall water supply to local creeks, with the vast majority of water sourced from surface water runoff. Local waterways are ephemeral under current baseline conditions, and the existing ephemeral nature of the creeks and the current flow regime will remain unchanged, and connectivity along the creek systems and into the downstream environments will not be affected. Groundwater drawdown may result in some ephemeral pools within local waterways drying out faster than they do during existing baseline conditions. However, the impact assessment concluded that while some pools can be expected to dry up faster than they do under existing baseline conditions, that the scale and magnitude of the change predicted is not a significant impact on aquatic ecosystems.

The impact assessment has concluded that impacts on subterranean and aquatic GDEs will be relatively minor. While stygofauna habitat associated with the alluvial aquifer will be disturbed by the Project through groundwater drawdown, the taxonomic groups affected are likely to be widespread throughout the region, including adjacent areas that will not be affected by the Project.

Aquatic GDEs are not expected to be significantly impacted as increases in flood levels will generally be minor and flooding is mostly confined within the banks of Tooloombah and Deep creeks (as in the existing case). Changes to surface water quality as a result of Project releases are predicted to be negligible, with downstream water quality expected to remain within the range of natural variability (refer to Appendix A5b, as summarised in Section 9.6.1 of Chapter 9 – Surface Water and Section 9.6.5 of Chapter 9 – Surface Water).

As presented in Section 16.10.1.2 of Chapter 16, assessment of the likely impacts of groundwater drawdown on Terrestrial GDEs considered a range of factors:

- Existing groundwater level and quality (from nearby aquifer bores), and therefore the suitability of groundwater for use by vegetation.

- Predicted drawdown of the water table aquifer in metres in localities where riparian vegetation occurs.
- The results of TEM studies which examined the distribution of various water and geological layers throughout the soil profile of riparian areas and provided some insight into the permeability of sediments underlying the riparian zone.
- The tolerance of tree species within the riparian zone to various natural and Project-induced stressors.
- Predicted changes to surface water flows and the frequency and duration of flood events, which may recharge bank storage for riparian vegetation.
- The results of boreholes drilled in transects across sections of the Tooloombah Creek and Deep Creek riparian zone, which describe the geological features of the alluvial zone and provide the results of laboratory analysis of the physical properties of alluvial sediments.

Tooloombah and Deep Creek were divided into several stream sections based on similar environmental characteristics and predicted exposure to drawdown, to facilitate a risk assessment for each stream reach. A series of technical workshops were convened involving specialists in the fields of groundwater, GDEs, impact assessment, geology and botany. Potential impacts of the Project were discussed and agreed, based on the collated Project information of ecological, geological and hydrogeological features.

A qualitative risk assessment was completed for each stream reach. As the effects of groundwater drawdown on vegetation can vary in scale, the likelihood of several scales of impact was considered for each stream reach, ranging from an 'Insignificant' impact on vegetation through to the 'Extreme' loss of structural integrity and ecological function of the vegetation community.

The likelihood of each impact rating occurring as a result of drawdown of the water table aquifer was assessed for each of the eight stream reaches. The likelihood of the impact occurring was classified as 'Rare', 'Unlikely', 'Possible', 'Likely' and 'Almost Certain'. If there was a 'Possible' (or above) likelihood of there being a 'Minor' impact on vegetation within the stream reach, then there was concluded to be an impact on vegetation within that stream reach.

The risk assessment shows that for all areas of Tooloombah Creek, any changes in vegetation as a result of groundwater drawdown are expected to be insignificant.

At Deep Creek, it is concluded that groundwater drawdown could result in at least a 'Possible' likelihood of there being a 'Minor' impact on Terrestrial GDEs within three stream reaches. The area predicted to be potentially affected consists of 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4.

The assessment demonstrates that impacts on vegetation as a result of groundwater drawdown are likely to vary in scale along the different stream reaches. For the majority of the 165-ha expected to be affected, impacts are likely to manifest as a gradual reduction in BioCondition scores, canopy cover and canopy height. In some areas vegetation may no longer meet the Regional Ecosystem description, however, will continue to provide ecosystem services, including minimising erosion and some fauna habitat, but with elevated weed cover.

Based on this assessment, the complete loss of vegetation and ecosystem services, including bank stability, is considered highly unlikely to occur at either Tooloombah or Deep Creek. This result, combined with a study of geomorphological values, indicates that bank collapse is unlikely to occur as a result of the Project.

It is important to note that the impact assessment for Terrestrial GDEs is considered to be a worst-case assessment for the following reasons:

- In identifying potential groundwater dependent RE, only areas with a groundwater level deeper than 15 mbgl were excluded from the assessment. This approach is considered to be conservative, as known depths to water table in published sources are generally reported as a maximum of 10 m for the vegetation species present within the Project Site (IESC 2018).
- It was assumed that the maximum EC of groundwater that may sustain terrestrial vegetation at the site is 10,000 µS/cm. Whereas, the upper soil salinity tolerance of key vegetation species present in the Project Area is generally equivalent to an EC of 4,000 to 8,000 µS/cm (DoA 2020).

Based on these conservative assumptions, it is possible that the area to be affected may be substantially less than 165.23 ha.

A draft GDEMMP has been prepared for the Project and is provided in Appendix 10e. The purpose of the GDEMMP is to minimise and manage the environmental impacts of the Project on GDEs through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and post operations. The GDEMMP includes monitoring of groundwater quality and level at key GDE locations, ongoing validation and recalibration of the groundwater model, identification of management measures, triggers and corrective actions for each GDE, and a process of adaptive management where the results of monitoring inform the ongoing implementation of management measures.

As part of the GDEMMP, the potential impacts of groundwater drawdown on Terrestrial GDEs along Deep Creek will be mitigated through the implementation of a revegetation program with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed to ensure the planting of drought tolerant species of similar ecological function as those with the potential to be impacted. This will ensure that existing habitat for terrestrial species is maintained, as well as reducing the potential for consequential impacts such as erosion and sedimentation which may be associated with vegetation loss. The revegetation program will be implemented from Project commencement ensuring sufficient timeframes for establishment of vegetation, given potential impacts are not expected to commence until at least 10 years after Project commencement.

- *changes to surface water quality and surface water hydrological regimes as a result of extreme flooding events and*

The Flood Study and Water Balance in Appendix A5b, as summarised in Section 9.6.1 of Chapter 9 – Surface Water, concluded that increases in flood levels are small and generally minor and flooding is mostly confined within the banks of Tooloombah and Deep creeks (as in the existing case). Changes to surface water quality as a result of Project releases are predicted to be negligible, with downstream water quality expected to remain within the range of natural variability (refer to Section 9.6.5 of Chapter 9 – Surface Water).

- *changes to surface water and reef water quality from increased sediment and pollutants entering surface water systems.*

A number of assessments have been undertaken to consider the risks to downstream environments, including the Broad Sound Fish Habitat Area (FHA), from changes to water quality (see the Sediment Loads Assessment in Appendix A15b, and Aquatic and Marine Ecology, GDE and GBR Impact Assessment in Appendix A10a). These assessments indicate that the risks to downstream

environments from sediments and/or high concentrations of water quality parameters contained in controlled or uncontrolled releases from the mine are low. The sediment load assessment using average climatic conditions indicates that the Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This is primarily due to the water management and sediment and erosion control systems for the Project being designed such that sediment-laden water is captured and treated on site. Additionally, current land use practices (cattle grazing) will cease across a large area, both on the Project Site and within upstream areas, thereby also reducing existing sediment and nutrient loads to downstream waters. Based on this assessment the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%. The assessment also considered non-average, very wet, climatic conditions when sediment might be expected to mobilise more readily and found that, even under non-average wet and very wet conditions, the sediment load from the Project will be less than that of current baseline conditions.

3.6.4.2.2 The Department has a low degree of confidence in the ability of the current groundwater model to adequately predict the likely direct and indirect impacts on MNES, both within the project site and downstream of the project site.

A significant upgrade and revision of the numerical groundwater model has been completed, as detailed in the Groundwater Model and Assessment Report in Appendix A6b, confirmed by the Numerical Groundwater Model Peer Review in Appendix A6e, and summarised in Section 10.2.4 in Chapter 10 – Groundwater. The peer review concluding statement provides that the assessment and modelling work has 'been carried out in a professional and rigorous manner that meets current industry standards. The modelling work has generally been completed in line with the Guiding Principles included in the Australian Groundwater Modelling Guidelines and in the IESC Uncertainty Analysis Guidance Note and we have not identified any fundamental flaws in the work which are likely to significantly effect model predictions'.

3.6.4.2.3 The limited time series data informing the model is not adequate to characterise the likely seasonal variations in groundwater levels and the model's ability to predict future variability. In particular:

Since the SEIS v2, additional data collection has been undertaken, with a further 17 rounds conducted, plus additional surface water and tidal measurements (boundary condition). Model calibration for the steady-state and transient modes gave scaled root mean square (SRMS) errors of 3.49% and 2.01%, respectively, and indicate good overall model calibration across the model domain and indicative vertical head gradients are generally consistent. The mass water balance error achieved a target threshold of <0.5% mass balance closure error for both steady state and transient calibration.

3.6.4.2.4 the current bore network is not spatially appropriate to understand the nature of the groundwater system

The bore network was expanded, and as noted above, additional monitoring data has been collected, and was used to develop and calibrate the numerical groundwater model. Subsequent assessments to better understand surface/groundwater interactions close to the Project (i.e. local interactions and effects) included groundwater levels in sections across identified pool areas and installation of additional bores (refer to summary in Section 10.3.7 of Chapter 10 – Groundwater).

3.6.4.2.5 the location of the seawater-freshwater interface has not been determined and is not considered by the model

Section 10.3.6.6 of Chapter 10 – Groundwater, describes the closest extent of the fresh-seawater interface as being well beyond the influence of the Project, based on both theoretical and observational data.

The groundwater modelling has provided (in Figure 8-6, Attachment 3 of Appendix A6a) groundwater flow directions in the Cainozoic/regolith and Styx Coal Measures layers for pre-mining, during operations, and post mining, showing that Project influence on groundwater flow directions diminishes to effectively nil at the Tooloombah – Deep Creek confluence, which is only 2.2km downstream of the Project, where the theoretical seawater interface surface would be below -280 mAHD, which is well beneath the predicted extent of drawdown. At the Ogmore bridge and WMP29 bore locations, both well outside the drawdown extent, and approximately 4km downstream of the Project, the theoretical fresh-seawater interface is still at least -40 to -80 mAHD. Any fresh-seawater interface at a shallower depth closer to the coast is well beyond the influence of the drawdown zone and any influence of the Project on groundwater flow direction.

3.6.4.2.6 the bore monitoring timeframes are not sufficient to calibrate the model to a high level of accuracy

As noted above, since the SEIS v2, additional data collection has been undertaken, with a further 17 rounds of samples conducted, plus additional surface water and tidal measurements (boundary condition). Model calibration for the steady-state and transient modes gave scaled root mean square (SRMS) errors of 3.49% and 2.01%, respectively and indicate good overall model calibration across the model domain and indicative vertical head gradients are generally consistent. The mass water balance error achieved a target threshold of <0.5% mass balance closure error for both steady state and transient calibration.

3.6.4.2.7 long-term pump tests have not been undertaken to provide a high level of confidence in understanding the groundwater system in the wider area

Representative site-specific data for hydraulic properties has been collected through aquifer testing conducted for the previous EIS and SEIS's and core permeability testwork (see Appendix A6g) as described in Section 5.6 of the Groundwater Model and Assessment Report in Appendix A6b. This data, combined with literature review and prior modelling work, has been tested as part of the Uncertainty Analysis.

3.6.4.2.8 the model is constrained by data derived from only shallower aquifers and does not provide a full representation of the hydrogeology of the project site and surrounds

As noted above, the dataset has been expanded and includes data from shallow, deeper and basement aquifers. Core permeability and packer testing, as well as slug testwork has been conducted, covering all aquifers across the hydrogeology of the project site and surrounds.

3.6.4.2.9 the backfilled final voids have not been appropriately parameterised in regards to their hydraulic properties

As summarised in Section 10.2.4 of Chapter 10 – Groundwater, and detailed in the Groundwater Model and Assessment Report in Appendix A6b, the backfilled voids have been simulated by applying Time-varying Material (TVM) properties to reflect the changes in the host rock properties

(pre-mining) to reflect the backfill spoil (broken, less consolidated rock), consistent with the Project mining and backfill schedule.

Consistent with the unconsolidated nature of the material emplaced, relatively high hydraulic conductivity (Kh = 1 m/d) and storage properties (Sy = 20% and Ss = $1.3x10^{-5}$ 1/m) have been assumed for the backfill, based on previous work by Dawkins (1998), along with an increased rate of recharge to allow for the expected likely composition of broken rock with limited fine material.

The peer review (Appendix A6e) accepted this approach.

3.6.4.2.10 flood heights are not adequately represented in the model as there is no site-specific data on flooding events and long-term trends

Revised flood modelling has been conducted, as presented in the Flood Study and Water Balance in Appendix A5b, including flood heights. Evidence of flooding following the 2010-2011 flood event was also noted during the ALS Water Sciences Group Baseline Aquatic Survey in June 2011 (Appendix A10b) with debris in trees found 7-8 m above the measured water level at that time.

Flood recharge has been considered as part of the revised numerical groundwater model, with specific discussion of the flood modelling work and more recent flood events reflecting in the transient calibration period since 2010 – 2010/2011, 2013 and 2017 (Groundwater Model and Assessment Report in Appendix A6b).

Note also that ongoing monitoring of pool levels and nearby installed alluvial (and coal measures) bores with loggers installed will allow for ongoing refinement of the groundwater model through future flood events.

3.6.4.2.11 there is a high level of uncertainty on the nature and extent of surface water-groundwater connectivity within and downstream of the project site and

The additional assessments conducted since the SEIS v2 are described in the response to Comment 1 of the Queensland DAF (Section 3.6.1.1) and Comment 1 of the Queensland DES (Section 3.6.2.1). As summarised in Section 10.3.7 of Chapter 10 – Groundwater, as well as in the technical supporting reports in Appendices A5b, A6d and A10a, the nature and extent of surface water – groundwater connectivity is now much better understood, particularly within and downstream of the Project site.

3.6.4.2.12 the sensitivity and uncertainty analysis is not adequate given the high risks with the proposed action and its potential impacts on MNES.

A new uncertainty and sensitivity analysis was undertaken as part of the development and peer review process for the revised numerical groundwater model, summarised in Sections 10.2.4 and 10.5.5 of Chapter 10 – Groundwater, and the Groundwater Model and Assessment Report in Appendix A6b, particularly Attachment 11. This (along with the subsequent sensitivity analysis) was accepted as suitable to the Project by the peer review (Appendix A6e), finding no fundamental flaws in the modelling work, and providing recommendations for improvements during model reviews (every 3 years from commencement of mining, although the draft EMP in Appendix 12 has committed to a review prior to mining commencing as well).

3.6.4.2.13 The Department notes the outcomes of the groundwater model peer review have not been incorporated into mine planning and management.

The revised numerical groundwater model documented in the Groundwater Model and Assessment Report in Appendix A6b and the Numerical Groundwater Model Peer Review in Appendix A6e have driven the assessment of existing environment, potential impacts, impact assessment and

monitoring and mitigation measures. In particular, the model peer review was staged throughout the early conceptualisation, model development, prediction, uncertainty and model / report finalisation stages, as detailed in Appendix A6e, and so the peer review was incorporated into the groundwater model and impact assessment during its development.

3.6.4.3 Comment 2

TOR Category or EIS Chapter	Groundwater; Surface Water; MNES	Submitters Reference to EIS Section (if provided)	Water resources – Key Risks Sections in AEIS: 16.10, 16.11, 16.14 and 16.20
Submitters Reference (if provided)	Comment 2: Water Resources - Key Risks		

Details of the Submission

Not adequately addressed - submissions 3, 11 and 21

Groundwater drawdown

Due to the Department's low confidence in the groundwater model predictions, the Department considers the AEIS does not provide an adequate assessment of potential groundwater drawdown impacts on riparian vegetation, surface water-groundwater connectivity, aquatic ecosystems (particularly waterholes), stygofauna, wetlands and surface water quality. There is the potential that the magnitude and spatial extent of groundwater drawdown has been underestimated.

The Department notes this reduces the Department's confidence in the accuracy of the proponent's assessment of the impacts of the proposed action on other MNES. For example, a loss of riparian vegetation, which also forms habitat for listed threatened species, may destabilise the already incised creek banks and promote erosion in an already highly erosive area. This may increase the amount of sediment entering the Styx River system and Broad Sound, and potentially cause adverse impacts on habitat for listed migratory species and on the values of the Great Barrier Reef World Heritage Area (GBRWHA).

Further, the Department notes the Department's low confidence in the groundwater model predictions results in uncertainty of the adequacy of the proposed environmental offset for residual significant impacts on listed threatened species and ecological communities (see comment 4 below). For example, an underestimation of the extent of groundwater drawdown may impact on riparian habitat which is proposed to be offset for residual significant impacts on the Koala and Greater Glider.

Controlled and uncontrolled surface water releases

The Department considers the proponent's assessment of the downstream impacts associated with the controlled and uncontrolled release of sediment-laden water into surface watercourses to be inadequate. The Department considers there is the potential for serious harm to protected matters in these circumstances because of the proposed size and construction material of the proposed dams, and their ability to capture rainfall events.

In particular, the Department considers the proponent's current assessment of surface water releases does not adequately consider the following:

- sodic and highly dispersive nature of the soils within the project site

- nature of the existing surface hydrology and severity of flood events (i.e. flood levels and frequency)
- sediment dilution and metal accumulation in high ecological value watercourses and
- the risks associated with the proposed action's proximity to the GBRWHA, including potential impacts to listed threatened and migratory species, and their habitat.

The Department also considers there is a lack of detail in the proposed water management system regarding treatment of sediment and contaminant-laden water, in particular the identification of:

- the water source for each water storage
- likely water quality of each water storage and the 'worst case scenario' water quality (i.e. from extreme weather events)
- all receiving environments for all water storages
- flood and extreme rainfall events that each water storage is designed to contain before an uncontrolled release occurs and
- the amount of freeboard that will be maintained.

The Department notes several proposed water quality objectives exceed the default ANZECC/ARMCANZ (2000) guideline values.

The Department considers that the commitment to develop and implement an Erosion and Sediment Control Plan (ESCP, without providing specific detail to manage impacts, is not adequate (see comment 3 below).

Mobilisation of the seawater-freshwater interface

The Department considers the proponent has not provided adequate information on the following:

- identification of the location of the saltwater intrusion interface and
- the potential for changes in the location of the saltwater intrusion on MNES.

The Department considers a thorough assessment of the potential mobilisation of the saltwater intrusion interface, as a result of groundwater drawdown, is critical due to the potential impacts on MNES. The Department considers the proponent has not adequately demonstrated that the saltwater intrusion interface is located outside of the zone of predicted drawdown (see comment 1 above).

Specifically, the Department notes the proponent has not undertaken:

- adequate field surveys to identify the location of the saltwater intrusion interface, including in all aquifers and aquifers near the coast
- modelling of potential seawater intrusion and inundation to support the groundwater model
- a 'worst case scenario' to determine the maximum possible inland extent of saltwater intrusion
- an assessment of the potential for the saltwater interface to interact with the material in the backfilled final voids
- an assessment of the potential impacts of the mobilisation of the saltwater interface on ecological values, including riparian habitat for listed threatened species and communities; and
- an assessment of the potential impacts of the mobilisation of the saltwater interface on the estuarine and marine ecosystems associated with the GBRWHA.

Surface water

The Department does not consider the surface water model is adequate to predict the likely impacts on sensitive receptors, including MNES, both within and downstream of the project site. In particular, the lack of confidence in the surface water model predictions arises from:

- a lack of local streamflow gauging data
- no site-specific information on the current state of the project site, including flood heights and frequency, and current runoff amounts
- no consideration of the uncertainty in the regional parameterisation
- the current bore monitoring network is not adequate to understand the nature of the surface water system and
- the timeframe over which the bores were monitored is not adequate.

The Department considers the annual water balance is unclear and is contingent on uncertain model inputs (i.e. groundwater flows). There is no detailed discussion of whether water extraction from creeks is required, including an input-output statement. The proponent has not undertaken an assessment of impacts on downstream values that may occur as a result of potential changes in flow regimes from water extraction rates and timing of those extractions.

The Department considers the AEIS does not adequately demonstrate how the proposed action will have a net benefit for the Great Barrier Reef, as stipulated in the objectives of the *Reef 2050 Long-Term Sustainability Plan* (2015), and Net Benefit Policy. The proponent has not undertaken calculations, or set parameters or targets, for water quality outcomes for the proposed action.

The AEIS does not include an impact assessment of potential flooding of the coal conveyor and its potential impacts on downstream surface water quality, including on the GBRWHA. The proponent notes this impact assessment will be undertaken during the final design of the coal conveyor. The Department considers the inclusion of this assessment in the AEIS is necessary in order for the potential impacts from the proposed action to be understood.

The Department notes no site investigation of potential acid sulphate soils (PASS on the project site, particularly within the zone of predicted drawdown, or in the surrounding region, has been undertaken by the proponent to inform an impact assessment on surface water quality. As such, the Department considers the proponent has not adequately demonstrated that the PASS will not impact on surface water quality as a result of the proposed action.

Final landform

The Department considers the proponent has not provided adequate detail, with supporting evidence, on the proposed construction and management of the final landform to ensure it does not pose an ongoing risk to the downstream environment, including the GBRWHA. The AEIS does not explain how the factors relevant to the final landform (i.e. soil characteristics, landform design, controls, etc.) have been considered to minimise erosion, contamination, and manage dispersive and erosive soil.

The proponent is proposing to backfill the final voids with coarse and fine coal rejects, which the Department considers will provide an additional source of contaminants that could be mobilised in groundwater. The Department considers the proponent has not adequately addressed this risk in the AEIS, including assessing alternate final landform options.

The Department considers that just a commitment to develop and implement a Rehabilitation Framework, Progressive Rehabilitation and Closure Plan (PRCP), and ESCP, without providing specific detail to manage impacts, is not adequate (see comment 3 below).

Suggested Solutions, Recommendations and Conditions

Based on the information in the AEIS, the Department considers the proponent has not adequately responded to submissions 3, 11 and 21.

Proponent Response

3.6.4.3.1 Not adequately addressed - submissions 3, 11 and 21

CQC note that submission 3, 11 and 21 said:

Submission 3:

A description of the location, extent and heritage values of the Great Barrier Reef World Heritage Area and National Heritage Place and the environment of the Great Barrier Reef Marine Park that may be impacted by the action.

Inconsistency with statements related to World Heritage property values, for example with potential seagrass habitat in Broad Sound:

- *There are no mapped seagrass beds known in the Broad Sound area (p16-88).*
- *Green Turtle is known to forage on seagrasses which does not occur in the majority of Broad Sound (p16-89).*
- *Broad Sound comprises wetland habitats including seagrass beds … (p16-89).*

Recommendation

Provide more detail on the attributes of the OUV criteria that specifically apply to the project that may be directly and/or directly impacted. Some examples are provided below for your consideration. The Department recommends using a similar format in the supplementary EIS.

The Department notes the EIS contains a high level description of Broad Sound and reference the values of Great Barrier Reef World and National Heritage Areas, however, does not describe the values of these heritage areas that may be impacted by the proposed action.

Note: More attributes for each criterion may be applicable to the project than those identified below.

- *Criterion (vii): contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance*
- *Attribute: vast mangrove and saltmarsh forests – discussion on the extent, condition, habitat value, etc. of Broad Sound.*
- *Attribute: breeding colonies of seabirds – discussion on the bird species of Broad Sound, their habitat requirements, habitat extent, importance of habitat, etc.*
- *Criterion (vii): Be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features*
- *Attribute: Geological and geomorphological features – project site is on a floodplain, discussion on flood regimes, prevalence and description of major flood events, storm surges and tides.*

- *Criterion (ix): Be outstanding examples representing significant ongoing ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals*
- *Attributes likely include coastal habitats, terrestrial habitats and marine habitat.*
- *Criterion (x): Contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation*
- *Attribute: Diversity of species (listed migratory birds, turtles, dolphins, dugong, and any other relevant listed threatened species.*
- *Criterion: Integrity of the GBRWHA*
- *Attribute: Intactness - representation of marine ecological, physical and chemical processes from the coast to deep abyssal waters, enabling key interdependent attributes to exist in their natural relationships:*
- *Interrelationship between water quality, listed threatened and migratory species and OUV.*
- *Attribute: Management and protection of GBRWHA – consideration of water quality management measures (at a local, regional and national level).*

CQC response

Due to the length of Submission 3, for ease of reference, the elements of concern have been split up into subsections which are repeated below, along with responses to each subsection:

- *A description of the location, extent and heritage values of the Great Barrier Reef World Heritage Area and National Heritage Place and the environment of the Great Barrier Reef Marine Park that may be impacted by the action.*

Chapter 16 provides an assessment of the potential impacts of the Project on downstream values including the Great Barrier Reef World Heritage Area and National Heritage Place and the environment of the Great Barrier Reef Marine Park. Descriptions, locations and extents and heritage values of these areas are provided in Chapter 16 - Section 16.7.9, including mapping illustrating their proximity to the Project Site.

- *Inconsistency with statements related to World Heritage property values, for example with potential seagrass habitat in Broad Sound:*
  - *There are no mapped seagrass beds known in the Broad Sound area (p16-88).*
  - *Green Turtle is known to forage on seagrasses which does not occur in the majority of Broad Sound (p16-89).*
  - *Broad Sound comprises wetland habitats including seagrass beds … (p16-89).*

A description of the values of Broad Sound is presented in Chapter 16 – Section 16.7.10.1.6. In regard to seagrass beds, as described in this Section 16.7.10.1.6, Broad Sound comprises a range of habitats including seagrass beds, lower intertidal and supratidal mudflats, and mangroves. Seagrass mapping data from the past 30 years has been collated across the GBR area (Carter et al. 2016). The only mapped seagrass beds known in the Broad Sound area are small patches located in the north-east corner of the wetland. There are no seagrass beds mapped in the vicinity of the Styx River estuary or surrounds. Extensive seagrass beds occur to the northwest in the Clairview area (approximately 53 km north of the Project) and in Shoalwater Bay, including small patches near the islands off Stanage Bay approximately 70 km north-east of the Project. Seagrasses require suitable

light conditions and appropriate nutrient levels. It is likely the extreme tidal range in Broad Sound influences the lack of seagrass, this is likely to be due to high turbidity levels and prolonged exposure of tidal flats during low tides.

- *Provide more detail on the attributes of the OUV criteria that specifically apply to the project that may be directly and/or directly impacted. Some examples are provided below for your consideration. The Department recommends using a similar format in the supplementary EIS.*

Chapter 16 of SEIS v3 provides detailed description of the values of the Great Barrier Reef World Heritage Area and Broad Sound (see Section 16.7.9 and 16.7.10). As outlined in Section 16.7.9.1, none of the specific locations referred to in the World Heritage listing for the GBR (e.g. Green Turtle breeding on Green Island and the Cod Hole tourist attraction), occur within or near the Project Area. However, Broad Sound and the surrounding region does make a contribution to OUV under the majority of the GBRWHA's listing criteria as the area supports a subset of the features and processes (e.g. natural beauty, biodiversity, coral reef accretion) identified in the listing. However, none of the area's contributions to OUV are critical contributions at the scale of the World Heritage Area (DE 2014b).

Of the environmental values present in the downstream environment, some can be considered to provide a higher contribution to the OUV of the GBRWHA than others. Broad Sound is considered one of the five main centres within the GBR for mangrove and saltmarsh communities (see Section 16.7.10.1.6 for a description of these habitats). As described in Section 16.7.10.2.1 of Chapter 16, Broad Sound is also considered to provide significant habitat for waterbirds including substantial aggregations of migratory shorebirds listed under the EPBC Act (DEE 2017a). Other attributes present in the vicinity of Broad Sound that contribute to the OUV of the GBRWHA include:

- A number of reef communities including a large reef system on the edge of Long Island.
- Extensive seagrass beds in the Clairview area (northwest) and in Shoalwater Bay (only small patches are present within Broad Sound Wetland).
- Inshore dolphin species, Australian hump-back dolphin (*Sousa sahulensis*) and Australian snubfin dolphin (*Orcaella brevirostris*) have been observed in Broad Sound and Shoalwater Bay.
- Multiple sites of flatback turtle nesting occur in areas near Broad Sound, such as Long Island, Avoid Island and Wild Duck Island, and Broad Sound is utilised as inter-nesting habitat by some flatback turtles.

An assessment of the Project has been undertaken against the significant impact criteria applicable to the GBRWHA, and considering advice provided in EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area (DE 2014b). This assessment is presented in Table 16-70 of Chapter 16 and replicated below in Table 3-13. The GBR is also a National Heritage place. National Heritage values of the GBR are the same values attributable to the GBRWHA. Therefore, the impacts on the GBR National Heritage Place are also assessed through the assessment of the GBRWHA. The application of the Significant Impact Guidelines, consideration of the referral guidelines and the impact assessment presented in Chapter 16 demonstrates that the Project will not result in a significant impact on the GBRWHA or the National Heritage Place.

Table 3-13: Significant Impact Assessment – Great Barrier Reef World Heritage Area

Values	Significant impact considerations	Response	Significant impact?
Criteria from EPBC Act Significant Impact Guidelines 1.1 (DE 2013)			
Values associated with geology or landscape	An action is likely to have a significant impact on natural heritage values of a World Heritage property if there is a real chance or possibility that the action will: • damage, modify, alter or obscure important geological formations in a World Heritage property • damage, modify, alter or obscure landforms or landscape features, for example, by excavation or infilling of the land surface in a World Heritage property • modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilising mobile landforms, such as sand dunes, in a World Heritage property • divert, impound or channelise a river, wetland or other water body in a World Heritage property and • substantially increase concentrations of suspended sediment, nutrients, heavy metals, hydrocarbons, or other pollutants or substances in a river, wetland or water body in a World Heritage property.	As the Project does not occur directly within the GBRWHA, it will not: • damage, modify, alter or obscure important geological formations • damage, modify, alter or obscure landforms or landscape features, for example, by excavation or infilling of the land surface and • modify, alter or inhibit landscape processes, for example, by accelerating or increasing susceptibility to erosion, or stabilising mobile landforms, such as sand dunes in the GBRWHA. The Project will not divert, impound or channelise a river, wetland or other water in the GBRWHA. If not managed properly, the Project has the potential to increase concentrations of suspended sediment and other contaminants in the GBRWHA via inputs from the mine site and adjacent areas flowing from Deep and Tooloombah Creeks. However, these inputs will be managed in such a way as to ensure sediment and contaminant loads remain within acceptable levels at all times. In particular, with the implementation of the site water management system and release conditions that have been devised for the Project, the overall sediment budget for the Project is expected to decrease sediment inputs from the catchment into the downstream GBR, thereby delivering a net benefit from the Project. If water is required to be released, any releases will be appropriately managed and timed to coincide with high flow events. Assessment of the potential impacts of controlled and uncontrolled releases on downstream water quality has demonstrated that, under release scenarios, the water quality of the receiving environment will be well within the range of the typical historical receiving water concentrations for each element examined (see Chapter 16, Section 16.7.3). As such there will be no impacts on water quality in the downstream environment as a result of water discharges.	No

Values	Significant impact considerations	Response	Significant impact?
Biological and ecological values	An action is likely to have a significant impact on natural heritage values of a World Heritage property if there is a real chance or possibility that the action will: • reduce the diversity or modify the composition of plant and animal species in all or part of a World Heritage property • fragment, isolate or substantially damage habitat important for the conservation of biological diversity in a World Heritage property • cause a long-term reduction in rare, endemic or unique plant or animal populations or species in a World Heritage property and • fragment, isolate or substantially damage habitat for rare, endemic or unique animal populations or species in a World Heritage property.	As discussed in preceding sections of this chapter, as well as Chapter 14 and 16, there are a number of biological and ecological values present in the downstream environment, including threatened and migratory species and marine plant communities. Of particular note are the aggregations of migratory shorebirds within the nearshore environments of Broad Sound (see Chapter 14), which are considered important in both a national and international context. Importantly, there will be no direct impacts to these ecological values from the Project. There is potential for these values to be indirectly impacted by the Project, via potential reductions in water quality, which may in turn reduce habitat values. However, as described above, with erosion and sediment controls, the mine site water management system and water release operating rules in place, the potential for impact to downstream habitats and species within the GBRWHA is considered very low.	No
Wilderness, natural beauty or rare or unique environment values	An action is likely to have a significant impact on natural heritage values of a World Heritage property if there is a real chance or possibility that the action will: • involve construction of buildings, roads, or other structures, vegetation clearance, or other actions with substantial, long-term or permanent impacts on relevant values and • introduce noise, odours, pollutants or other intrusive elements with substantial, long-term or permanent impacts on relevant values.	As the Project is located approximately 10 km upstream of the GBRWHA and does not involve works directly within the GBRWHA, construction works will not result in any significant impact to the values of the GBRWHA. Nor will there be any effects of noise or odours. The key potential risk of the Project to the GBRWHA is increasing concentrations of suspended sediment and other contaminants in the GBRWHA via inputs from the mine site and adjacent areas flowing from Deep and Tooloombah Creeks. However, this is unlikely to occur as these inputs will be managed in a such as way as to ensure sediment and water quality parameter loads remain within acceptable levels at all times. If water is required to be released, any releases will be appropriately managed and timed to coincide with high flow events. Water quality analysis shows metals, sulphate and EC will be well within the range of the typical historical receiving water concentrations for each element examined. As	No

Values	Significant impact considerations	Response	Significant impact?
		such there will be no impacts on water quality in the downstream environment as a result of water discharges. Importantly, the overall sediment budget for the Project is expected to decrease sediment inputs from the catchment into the GBR, thereby delivering a net benefit from the Project.	
Criteria from EPBC Act referral guidelines for the *Outstanding Universal Value of the Great Barrier Reef World Heritage Area*			
Attributes	Will the proposed action of itself, or in combination with other relevant impacts, result in loss or degradation of areas that are essential for maintaining the beauty of the property? Will the proposed action of itself, or in combination with other relevant impacts, impact on the key interrelated and interdependent elements in their natural relationships? Will the proposed action of itself, or in combination with other relevant impacts, result in the loss of necessary elements that are essential for the long-term conservation of the area's ecosystems and biodiversity? Will the proposed action of itself, or in combination with other relevant impacts, result in the loss or degradation of habitats required for maintaining the diverse fauna and flora of the region?	The nearshore areas of the GBRWHA that are downstream of the Project do not include areas that are essential for maintaining the beauty of the property. However, there are a number of important ecological features. Importantly, there will be no direct impacts to these ecological values from the Project given the Project is located at least 10 km upstream. However, they do have the potential to be indirectly impacted by the Project, via reductions in water quality, which could, in turn, reduce habitat values. However, erosion and sediment controls will be in place, as well as a mine site water management system and water release operating rules which have been designed to ensure that quality of water releases are within acceptable levels. As such, the risk of indirect impacts resulting from reduced water quality occurring is considered low, and alterations to habitat or population level impacts to values are highly unlikely.	No
Wholeness	Will the proposed action of itself, or in combination with other relevant impacts, result in the loss of any elements necessary for the property to express its OUV? Will the proposed action of itself, or in combination with other relevant impacts, reduce the size or change the boundary of the property?	The Project will not result in the loss of any elements, features or processes necessary for the GBRWHA to express its OUV, nor will there be any reductions in size or boundaries of the property.	No

Values	Significant impact considerations	Response	Significant impact?
	Will the proposed action of itself, or in combination with other relevant impacts, impact on any of the features and processes that convey its OUV?		
Intactness	Will the proposed action of itself, or in combination with other relevant impacts, result in a 'greenfield' development or the fragmentation, loss and/or degradation of any ecological, physical or chemical processes or of the key features, processes and attributes of the property that express its OUV? Will the proposed action of itself, or in combination with other relevant impacts, impact on the key interrelated and interdependent attributes or their natural relationships within the property?	The Project is located outside of the GBRWHA and will not result in a 'greenfield' development or fragmentation of key features of the property. Water quality is a key attribute that underpins the overall health of the GBRWHA and therefore requires consideration in terms of interrelatedness and interdependence of natural values. The Project has the potential to increase concentrations of suspended sediment and other water quality parameters in the GBRWHA via inputs from the mine site and adjacent areas flowing from Deep and Tooloombah Creeks. However, erosion and sediment controls will be in place, along with a mine site water management system and water release operating rules. These will ensure that sediment and water quality parameter loads within water releases from the site will remain within acceptable levels at all times. This will ensure the intactness of the GBRWHA is not affected by the Project.	No
Threats	Will the proposed action of itself, or in combination with other relevant impacts, result in increased adverse effects of development, neglect or any other degrading process? Will the proposed action of itself, or in combination with other relevant impacts, result in an increase in processes that may cause deterioration?	Increased sediment and water quality parameter loads are a significant issue for nearshore environments within the GBRWHA. In the context of the Project, additional sediment/water quality parameters may enter the marine environment either as a result of increased instream erosion and/or directly within mine site runoff and discharges. Therefore, without the appropriate management regimes in place, there is a risk the Project will exacerbate threats to the GBRWHA. However, the erosion and sediment controls, as well as the mine site water management system and water release operating rules will ensure that sediment and water quality parameter loads within water releases from the site will remain within acceptable levels at all times. In particular, in an average year, the overall sediment budget for the Project is expected to decrease sediment discharges from the catchment into the downstream GBR by approximately 50%, thereby delivering a net benefit from the Project.	No

Submission 11:

An assessment of impacts from existing (or baseline) water quality observed in tributaries discharging into Broad Sound was not undertaken.

Water quality impacts are likely to be limited to the mobilisation of sediments and associated nutrients (p16-135).

Recommendation

Identify and provide a detailed discussion of the impacts, during construction, operation and decommissioning phases, on the attributes of the OUV criteria identified as relevant to the project. This section should not provide a general overview of the project's impacts (with a reference to another EIS chapter) – impacts need to be discussed specific to each of the OUV criteria with information sourced from other EIS chapters to reinforce arguments and justifications.

The Department expects, at a minimum, detailed discussions of the following potential impacts:

- *Degradation of water quality from changes in hydrological regimes, increased sedimentation, surface water contamination from coal fines, dust and leachates, exposure of potential acid sulphate soils (PASS) (within the predicted extent of drawdown) and groundwater contamination. - Groundwater extraction leading to reduced water table and/or stream flow, groundwater extraction resulting in the movement of the freshwater/saltwater interface leading to saline contamination of coastal groundwater reserves, and surface water extraction leading to reduced stream flow.*
- *Loss and degradation of habitat for terrestrial and aquatic species associated with the degradation of water quality and extraction of surface water and groundwater – which may affect listed threatened and migratory species in Broad Sound.*

The Department further notes that the project site is located on a major floodplain, the area is subject to large tidal ranges, and storm surges have the potential to result in inundation and runoff issues – particularly the proposed coal conveyor belt under the Deep Creek Bridge of the Bruce Highway.

Provide a discussion on the potential impacts on water quality from flooding events. This discussion should include information relating to:

- *historical flood events, particularly how the site floods, frequency of flood events and the severity of flood events*
- *dam and water storage technical requirements, including justification of the appropriateness of these technical requirements*
- *how flooding of the project site during construction, operation and decommissioning of the project has the potential to contribute to water quality degradation in relation to the attributes of the OUV criteria*
- *how changes in hydrological regimes as a result of the construction of the mine, stockpiles and train load out facility may impact on the attributes of the OUV criteria.*

In this discussion of impacts:

- *demonstrate how the proposed action will provide a net benefit for water quality in the Great Barrier Reef World Heritage property, consistent with the Reef 2050 Long-Term Sustainability Plan (2015); and - reference the key values and attributes outlined in the Great Barrier Reef*

Outlook Report 2014 (Great Barrier Reef Marine Park Authority) that may be impacted by the proposed development.

CQC response

Due to the length of Submission 11, for ease of reference, the elements of concern have been split up into subsections which are repeated below, along with responses to each subsection:

- *Identify and provide a detailed discussion of the impacts, during construction, operation and decommissioning phases, on the attributes of the OUV criteria identified as relevant to the project. This section should not provide a general overview of the project's impacts (with a reference to another EIS chapter) – impacts need to be discussed specific to each of the OUV criteria with information sourced from other EIS chapters to reinforce arguments and justifications.*

A detailed discussion of the impacts of the Project during all phases is presented in Chapter 16 – Section 16.8 and 16.10. As described above, an assessment of the Project has been undertaken against the significant impact criteria applicable to the GBRWHA, and considering advice provided in EPBC Act referral guidelines for the Outstanding Universal Value of the Great Barrier Reef World Heritage Area (DE 2014b). This assessment is presented in Table 16-70 of Chapter 16 and replicated in Table 3-13, above. The application of the Significant Impact Guidelines, consideration of the referral guidelines for the OUV of the GBRWHA, and the impact assessment presented in Chapter 16 demonstrates that the Project will not result in a significant impact on the GBRWHA or the National Heritage Place.

The Department expects, at a minimum, detailed discussions of the following potential impacts:

- *Degradation of water quality from changes in hydrological regimes, increased sedimentation, surface water contamination from coal fines, dust and leachates, exposure of potential acid sulphate soils (PASS) (within the predicted extent of drawdown) and groundwater contamination. - Groundwater extraction leading to reduced water table and/or stream flow, groundwater extraction resulting in the movement of the freshwater/saltwater interface leading to saline contamination of coastal groundwater reserves, and surface water extraction leading to reduced stream flow.*

As discussed in Section 9.6.2.1 of Chapter 9 – Surface Water, an assessment of changes to flow within the streams as a result of a reduction in baseflow found the impact to be negligible, and that there would be no impact on the number of days that flow occurs in the receiving watercourses.

A detailed assessment of water quality impacts to surface waters from the Project is provided in Section 9.6.5 of Chapter 9 – Surface Water, including a direct assessment of the impact of a selection of parameters potentially elevated in MAW on downstream receiving waters. This found that all parameters were well within the range of the typical historical receiving water concentrations, and as such, releases from the site water management system are predicted to have no impact on downstream water quality.

Note that the water management system contains and manages different water types on the site, preferentially retaining and reusing MAW on-site (i.e. water affected by coal fines and leachates).

The Sediment Loads Assessment in Appendix A15b found, using average climatic conditions, that the Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This is primarily due to the water management and sediment and erosion control systems for the Project being designed such that sediment-laden water is captured

and treated on site. Additionally, current land use practices (cattle grazing) will cease across a large area, both on the Project Site and within upstream areas, thereby also reducing existing sediment and nutrient loads to downstream waters. Based on this assessment the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%. The assessment also considered non-average, very wet, climatic conditions when sediment might be expected to mobilise more readily and found that, even under non-average wet and very wet conditions, the sediment load from the Project will be less than that of current baseline conditions.

Section 5.3.6 of Chapter 5 – Land provides a detailed assessment of the likelihood of acid sulfate soils (ASS), either actual (AASS) or potential (PASS) within the Project disturbance area and within the groundwater drawdown extent. Based on existing risk mapping, topographic levels in the area, and both geological, geomorphological and soils investigation results, the assessment concluded that there is no evidence for ASS in the area, and that there is no justification for detailed ASS investigations (based on Dear et al. 2014).

Regarding groundwater drawdown effects, these have been detailed in Section 10.5.1.2 of Chapter 10 – Groundwater. Water table drawdown is predicted, however as discussed in Section 9.6.2.1 of Chapter 9 – Surface Water, an assessment of changes to flow within the streams as a result of a reduction in baseflow found the impact to be negligible, and that there would be no impact on the number of days that flow occurs in the receiving watercourses. As addressed in the response to Comment 1 of the Queensland DAF (Section 3.6.1.1), the Project will not cause a mobilisation of the groundwater-saltwater interface.

- *Loss and degradation of habitat for terrestrial and aquatic species associated with the degradation of water quality and extraction of surface water and groundwater – which may affect listed threatened and migratory species in Broad Sound.*

Changes to surface water quality as a result of the Project are described in Chapter 16 – Section 16.8.3. Based on the results of this assessment there will be no changes to water quality in the downstream environment as a result of the Project, and therefore there are not expected to be any impacts to species that utilise water or intertidal habitats downstream of the Project. No extraction of surface water is proposed for the Project.

Impacts of groundwater drawdown are described in Chapter 16 – Section 16.8.5. Potential impacts to groundwater quality is described on Chapter 16 – Section 16.8.6. Groundwater drawdown is not predicted to occur beneath the Styx River and therefore loss of potential baseflow in the Styx River estuary and Broad Sound wetlands, which provides habitat for threatened or migratory species, will not occur.

The impact assessment on threatened and migratory species in Broad Sound is presented in Chapter 16 – Section 16.10.3.2. As described in this section a total of 30 species listed under the EPBC Act have been identified as known or likely to occur in the downstream environment. Of these, 23 are birds (including 16 migratory shorebirds), four are mammals and three are reptiles.

The Project will not result in any impacts on these species. There will be no direct impacts on habitat for these species as a result of the Project. As detailed in Chapter 16 (particularly Sections 16.8.3, 16.8.5 and 16.8.6) there will be no indirect impacts on the downstream environment, including Broad Sound, as a result of the Project.

Nonetheless, significant impact assessments for these species are presented in Chapter 16 – Table 16-65 (migratory shorebirds), Table 16-66 (migratory species), Table 16-67 (critically endangered and endangered species), Table 16-68 (vulnerable species), Table 16-69 (threatened marine fauna) The significant impact assessments have been undertaken in accordance with the relevant EPBC Act Policies and based on these assessments, the Project is not expected to result in a significant residual impact to any threatened or migratory species in the downstream environment.

The Department further notes that the project site is located on a major floodplain, the area is subject to large tidal ranges, and storm surges have the potential to result in inundation and runoff issues – particularly the proposed coal conveyor belt under the Deep Creek Bridge of the Bruce Highway.

Provide a discussion on the potential impacts on water quality from flooding events. This discussion should include information relating to:

- *historical flood events, particularly how the site floods, frequency of flood events and the severity of flood events*
- *dam and water storage technical requirements, including justification of the appropriateness of these technical requirements*
- *how flooding of the project site during construction, operation and decommissioning of the project has the potential to contribute to water quality degradation in relation to the attributes of the OUV criteria*
- *how changes in hydrological regimes as a result of the construction of the mine, stockpiles and train load out facility may impact on the attributes of the OUV criteria.*

In this discussion of impacts:

- *demonstrate how the proposed action will provide a net benefit for water quality in the Great Barrier Reef World Heritage property, consistent with the Reef 2050 Long-Term Sustainability Plan (2015); and - reference the key values and attributes outlined in the Great Barrier Reef Outlook Report 2014 (Great Barrier Reef Marine Park Authority) that may be impacted by the proposed development.*

These items are all addressed within the responses to earlier parts of Submission 11, above.

Submission 21:

Water Resources Assessment and response to the advice from the Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining Development (IESC).

The Department considers that the project has the potential to impact on water resources, particularly through:

- *changes to groundwater/surface water interactions from groundwater drawdown including the alteration of watercourse flow regimes and the loss of permanent discharge pools which may provide potential habitat for nationally listed aquatic species*
- *exposure of potential acid sulphate soils (PASS) in stream beds as a result of groundwater drawdown*
- *changes to water quality from mining operations and the release of mine-affected water into surface watercourses*
- *the disruption of aquifers and the alteration of the groundwater/salt water interface near the coast from groundwater drawdown*

- *the degradation and potential loss of ground-water dependent ecosystems (GDEs) along major watercourses due to groundwater depressurisation and the severing of base flow*
- *changes to surface water quality and surface water hydrological regimes as a result of extreme flooding events and*
- *changes to surface water and reef water quality from increased sediment and pollutants entering surface water systems.*

Recommendation

- *Include a detailed response to the IESC comments on the draft EIS in the supplementary EIS.*

CQC response

See response regarding submission 21 in Section 3.6.4.2.1, above.

3.6.4.3.2 Groundwater drawdown - Confidence in the model and the assessment of impacts

Due to the Department's low confidence in the groundwater model predictions, the Department considers the AEIS does not provide an adequate assessment of potential groundwater drawdown impacts on riparian vegetation, surface water-groundwater connectivity, aquatic ecosystems (particularly waterholes), stygofauna, wetlands and surface water quality. There is the potential that the magnitude and spatial extent of groundwater drawdown has been underestimated.

CQC response

A significant upgrade and revision of the numerical groundwater model has been completed, as detailed in the Groundwater Model and Assessment Report in Appendix A6b, confirmed by the Numerical Groundwater Model Peer Review in Appendix A6e, and summarised in Section 10.2.4 in Chapter 10 – Groundwater. The peer review concluding statement provides that the assessment and modelling work has 'been carried out in a professional and rigorous manner that meets current industry standards. The modelling work has generally been completed in line with the Guiding Principles included in the Australian Groundwater Modelling Guidelines and in the IESC Uncertainty Analysis Guidance Note and we have not identified any fundamental flaws in the work which are likely to significantly effect model predictions'.

The revised numerical groundwater model documented in the Groundwater Model and Assessment Report in Appendix A6b and the Numerical Groundwater Model Peer Review in Appendix A6e have driven the assessment of existing environment, potential impacts, impact assessment and monitoring and mitigation measures. In particular, the model peer review was staged throughout the early conceptualisation, model development, prediction, uncertainty and model / report finalisation stages, as detailed in Appendix A6e, and so the peer review was incorporated into the groundwater model and impact assessment during its development.

In addition to the new groundwater study, CQC has commissioned extensive additional technical studies for surface water/hydrology (Appendix 5b), a sediment budget for the site and associated catchment (Appendix A15b) and studies of interactions between groundwater and surface water resources (Appendices A6d, A10a, A10d). These additional assessments have informed an assessment of potential impacts of the Project on ecological values of the Study area, including those to riparian vegetation, surface water-groundwater connectivity, aquatic ecosystems, stygofauna, wetlands and surface water quality. Collectively, these new studies provide an updated assessment of the potential impacts of the Project on MNES.

3.6.4.3.3 Groundwater drawdown - Riparian vegetation loss and downstream sedimentation

The Department notes this reduces the Department's confidence in the accuracy of the proponent's assessment of the impacts of the proposed action on other MNES. For example, a loss of riparian vegetation, which also forms habitat for listed threatened species, may destabilise the already incised creek banks and promote erosion in an already highly erosive area. This may increase the amount of sediment entering the Styx River system and Broad Sound, and potentially cause adverse impacts on habitat for listed migratory species and on the values of the Great Barrier Reef World Heritage Area (GBRWHA).

Based on assessments undertaken to investigate potential impacts of the Project upon Terrestrial GDES, the complete loss of vegetation and ecosystem services, including bank stability, is considered highly unlikely to occur at either Tooloombah or Deep Creek. This result, combined with a study of geomorphological values, indicates that bank collapse is unlikely to occur as a result of the Project.

It is important to note that the impact assessment for Terrestrial GDEs is considered to be a worst-case assessment for the following reasons:

- In identifying potential groundwater dependent RE, only areas with a groundwater level deeper than 15 mbgl were excluded from the assessment. This approach is considered to be conservative, as known depths to water table in published sources are generally reported as a maximum of 10 m for the vegetation species present within the Project Site (IESC 2018).
- It was assumed that the maximum EC of groundwater that may sustain terrestrial vegetation at the site is 10,000 µS/cm. Whereas, the upper soil salinity tolerance of key vegetation species present in the Project Area is generally equivalent to an EC of 4,000 to 8,000 µS/cm (DoA 2020).

Based on these conservative assumptions, it is possible that the area to be affected may be substantially less than 165.23 ha.

A draft GDEMMP has been prepared for the Project and is provided in Appendix 10e. The purpose of the GDEMMP is to minimise and manage the environmental impacts of the Project on GDEs through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and post operations. The GDEMMP includes monitoring of groundwater quality and level at key GDE locations, ongoing validation and recalibration of the groundwater model, identification of management measures, triggers and corrective actions for each GDE, and a process of adaptive management where the results of monitoring inform the ongoing implementation of management measures.

As part of the GDEMMP, the potential impacts of groundwater drawdown on Terrestrial GDEs along Deep Creek will be mitigated through the implementation of a revegetation program with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed to ensure the planting of drought tolerant species of similar ecological function as those with the potential to be impacted. This will ensure that existing habitat for terrestrial species is maintained, as well as reducing the potential for consequential impacts such as erosion and sedimentation which may be associated with vegetation loss. The revegetation program will be implemented from Project commencement ensuring sufficient timeframes for establishment of vegetation, given potential impacts are not expected to commence until at least 10 years after Project commencement.

3.6.4.3.4 Groundwater drawdown - Adequacy of proposed offsets

Further, the Department notes the Department's low confidence in the groundwater model predictions results in uncertainty of the adequacy of the proposed environmental offset for residual significant impacts on listed threatened species and ecological communities (see comment 4 below). For example, an underestimation of the extent of groundwater drawdown may impact on riparian habitat which is proposed to be offset for residual significant impacts on the Koala and Greater Glider.

Where offsets for these species are proposed to be located on Mamelon, offset areas have been located outside of the area of potential groundwater drawdown impact. A more detailed response regarding the adequacy of offsets (including those proposed to be situated on Mamelon) is given in response to DAWE comment 4, in Section 3.6.4.5, below).

3.6.4.3.5 Controlled and uncontrolled surface water releases

The Department considers the proponent's assessment of the downstream impacts associated with the controlled and uncontrolled release of sediment-laden water into surface watercourses to be inadequate. The Department considers there is the potential for serious harm to protected matters in these circumstances because of the proposed size and construction material of the proposed dams, and their ability to capture rainfall events.

In particular, the Department considers the proponent's current assessment of surface water releases does not adequately consider the following:

- *sodic and highly dispersive nature of the soils within the project site*
- *nature of the existing surface hydrology and severity of flood events (i.e. flood levels and frequency)*
- *sediment dilution and metal accumulation in high ecological value watercourses and*
- *the risks associated with the proposed action's proximity to the GBRWHA, including potential impacts to listed threatened and migratory species, and their habitat.*

CQC response

In particular, the Department considers the proponent's current assessment of surface water releases does not adequately consider the following:

- *sodic and highly dispersive nature of the soils within the project site*

A detailed Draft ESCP has been prepared for the Project (Appendix A15a) which identifies the measures to be implemented to control erosion and sediment runoff from the site. The plan was prepared and has been certified by a Certified Professional in Erosion and Sediment Control, and includes consideration of sodic soils. The soil management measures outlined in Chapter 5 – Land and waste rock and rejects management in Chapter 8 – Waste Rock and Rejects and Chapter 11 – Rehabilitation and Decommissioning specifically consider the management and mitigation of sodic soil impacts as part of stripping, stockpiling and rehabilitation works, including amelioration to avoid excessive erosion of sodic soils and materials.

- *nature of the existing surface hydrology and severity of flood events (i.e. flood levels and frequency)*

Existing surface hydrology and flooding has been addressed within the Flood Study and Water Balance in Appendix A5b, including flood levels and frequency, and summarised in Sections 9.3.4.4 (existing conditions) and 9.6.1 (developed conditions) of the SEIS v3, Chapter 9 – Surface Water.

- *sediment dilution and metal accumulation in high ecological value watercourses and*

Water quality within site dams and discharge of waters from the site have specifically considered the results from the Geochemical Assessment in Appendix A3b, which provides that leachate from bulk mine waste materials exposed to oxidising conditions would have a pH in the range 8.5 to 9.5; a low to moderate salinity; very low acidity (with net positive alkalinity); be dominated by sodium, chloride and sulfate ions, with very low calcium, magnesium and potassium; low sulfate (compared to ANZG default guideline values); and low metal / metalloid concentrations, with the exception of aluminium, arsenic, molybdenum and selenium, and to a lesser extent zinc and vanadium, in some of the samples.

The water quality assessment conducted as part of the Flood Study and Water Balance in Appendix A5b, using a set of parameters to represent MAWs, showed that releases (both controlled and uncontrolled releases) will result in only small changes to downstream water quality with downstream water quality to remain within the range of natural variability.

- *the risks associated with the proposed action's proximity to the GBRWHA, including potential impacts to listed threatened and migratory species, and their habitat.*

A number of assessments have been undertaken to consider the risks to downstream environments, including the Styx River Estuary, Broad Sound and the GBR, from changes to water quality (see the Sediment Loads Assessment in Appendix A15b, and Aquatic and Marine Ecology, GDE and GBR Impact Assessment in Appendix A10a). These assessments indicate that the risks to downstream environments from sediments and/or high concentrations of water quality parameters contained in controlled or uncontrolled releases from the mine are low. The sediment load assessment using average climatic conditions indicates that the Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This is primarily due to the water management and sediment and erosion control systems for the Project being designed such that sediment-laden water is captured and treated on site. Additionally, current land use practices (cattle grazing) will cease across a large area, both on the Project Site and within upstream areas, thereby also reducing existing sediment and nutrient loads to downstream waters. Based on this assessment the Project will reduce the sediment load to the downstream environment by approximately 2,740 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%.

Significant impact assessments have been undertaken to assess the potential impacts on downstream ecological values including listed threatened and migratory species and the GBR (see Section 16.9.3 and 16.9.4 of Chapter 16 – MNES). The assessments concluded that the Project will not result in a significant impact to any downstream value.

3.6.4.3.6 *The Department also considers there is a lack of detail in the proposed water management system regarding treatment of sediment and contaminant-laden water*

In particular the identification of:

- *the water source for each water storage*
- *likely water quality of each water storage and the 'worst case scenario' water quality (i.e. from extreme weather events)*

- *all receiving environments for all water storages*
- *flood and extreme rainfall events that each water storage is designed to contain before an uncontrolled release occurs and*
- *the amount of freeboard that will be maintained.*

CQC response

- *the water source for each water storage*

The water source and receiving environment for each water storage is detailed in Table 9-11 'Proposed infrastructure details' in Section 9.4 of Chapter 9 – Surface Water.

- *likely water quality of each water storage and the 'worst case scenario' water quality (i.e. from extreme weather events)*

Results have been presented in Section 9.6.5 of Chapter 9 – Surface Water for predicted Dam 1 water quality. This shows the 1 to 99 percentile water quality levels resulting from the modelling, which is further described in the Flood Study and Water Balance in Appendix A5b. As the risk of water releases from other water storages are very low due to operating empty (i.e. pumping to Dam 1 after rainfall to maintain empty as much as possible), results for these other dams have not been presented, but the Dam 1 storage is representative of the quality of water within the site water management system and of releases from the site.

- *all receiving environments for all water storages*

Controlled releases would occur from Dam 1 to Deep Creek, via a controlled release structure. Mine affected water dams that could potentially overflow directly to the receiving environment if inflows exceed the storage design criteria include Dam 1 (to Tooloombah Creek), and Dam 4 (to a tributary to Deep Creek). Section 9.4.3 of Chapter 9 – Surface Water, particularly Table 9-11 provides a description of each storage, including receiving waters.

The minimum dilution ratio for controlled releases, for low flows in the receiving watercourse, is 5 (i.e. receiving water flow is 5 times release flow). The dilution ratio increases to be in the range of 30 to 80 for higher receiving water flow rates. The impacts of mine water releases on receiving water quality have been assessed in detail (see section 8.4.10 of the Flood Study and Water Balance in Appendix A5b), concluding that downstream water quality will remain within the range of natural variability with the modelled Project releases. The assessment of water quality impacts and management measures includes the impacts of uncontrolled spills that may occur during significant wet weather events.

- *flood and extreme rainfall events that each water storage is designed to contain before an uncontrolled release occurs and*

As noted in Section 9.4.3.4 of Chapter 9 – Surface Water environmental dams and Dam 4 are sized based on the 9.5% AEP, 24 hour rainfall event. Water is preferentially pumped to Dam 1 prior to overflows occurring, however, and so predicted overflows from site storages are very low. Section 9.6.3.3 of Chapter 9 – Surface Water details the expected level of risk of overflow from each of the dams.

For Dam 1, the operating volume (1,800 ML) and peak storage volume (2,783 ML) have been set to best provide for water supply security and minimisation of releases (both controlled and uncontrolled). A stated event frequency is not provided, however Section 9.6.3.3 of Chapter 9 –

Surface Water provides the expected level of risk of overflow, which is based on multiple scenarios providing for the full range of climatic scenarios, and the resultant statistical level of risk.

- *the amount of freeboard that will be maintained.*

Dams, other than Dam 1, will be designed with the freeboard requirement in accordance with the DES consequence manual for regulated structures, with allowance for wave run-up from a 9.5% AEP wind. For Dam 1, the operating level has been designated as 1,800 ML, with a full storage capacity of 2,783 ML. This provides for a nominal freeboard of between 500 – 700mm, which exceeds the 1% AEP 48 hour event (nominally 502mm). Regardless, freeboard will exceed the allowance for wave run-up from a 9.5% AEP wind.

3.6.4.3.7 The Department notes several proposed water quality objectives exceed the default ANZECC/ARMCANZ (2000) guideline values.

CQC response

A detailed assessment of the existing baseline data presented in the Surface Water Quality Technical Report in Appendix A5a finds that a number of parameters exceed the current Environmental Protection (Water and Wetland Biodiversity) Policy 2019 scheduled guideline values. These are based on well over the recommended 24 data points under the ANZG (2018) guidelines, and legitimately demonstrate existing concentrations in receiving waters. As the current water quality already exceeds the guideline values, site specific trigger values have been derived based on the 80th percentile of receiving waters, as is recommended for slightly to moderately disturbed waters under the ANZG (2018) guidelines.

3.6.4.3.8 The Department considers that the commitment to develop and implement an Erosion and Sediment Control Plan (ESCP), without providing specific detail to manage impacts, is not adequate (see comment 3 below).

CQC response

A detailed Draft ESCP has been prepared for the Project (see Appendix A15a) which identifies the measures to be implemented to control erosion and sediment runoff from the site. The plan was prepared and has been certified by a Certified Professional in Erosion and Sediment Control (CPESC), and includes an inspection checklist and Typical Standard Installation Details. This will be updated prior to works commencing and throughout the Project life as needed, to ensure it remains up to date at all times. Installation details are provided in Appendix C to the plan, with the strategy described within the report. Detailed placement will be determined during detailed design, and re-certified by a CPESC with the finalisation of the plan (prior to works commencing).

3.6.4.3.9 Mobilisation of the seawater-freshwater interface

The Department considers the proponent has not provided adequate information on the following:

- *identification of the location of the saltwater intrusion interface and*
- *the potential for changes in the location of the saltwater intrusion on MNES.*

The Department considers a thorough assessment of the potential mobilisation of the saltwater intrusion interface, as a result of groundwater drawdown, is critical due to the potential impacts on MNES. The Department considers the proponent has not adequately demonstrated that the saltwater intrusion interface is located outside of the zone of predicted drawdown (see comment 1 above).

Specifically, the Department notes the proponent has not undertaken:

- *adequate field surveys to identify the location of the saltwater intrusion interface, including in all aquifers and aquifers near the coast*
- *modelling of potential seawater intrusion and inundation to support the groundwater model*
- *a 'worst case scenario' to determine the maximum possible inland extent of saltwater intrusion*
- *an assessment of the potential for the saltwater interface to interact with the material in the backfilled final voids*
- *an assessment of the potential impacts of the mobilisation of the saltwater interface on ecological values, including riparian habitat for listed threatened species and communities; and*
- *an assessment of the potential impacts of the mobilisation of the saltwater interface on the estuarine and marine ecosystems associated with the GBRWHA.*

CQC response

The Project will not cause a mobilisation of the groundwater-saltwater interface.

Despite the salinity evident in some of the groundwater samples collected at the Project Site and surrounding areas, it has been determined that the salinity in the groundwaters intersected by the Project is derived from regional geochemistry, and not an oceanic saltwater. If any interface between oceanic saltwater and freshwater does exist within the groundwater in the vicinity of the Project, it will be hundreds of meters below sea level at the location of the pits, or beyond the extent of any drawdown influence from the Project, and would therefore not result in any movement of any interface between seawater and groundwater.

A detailed explanation of the reasoning for the above is provided in Section 10.3.6.7 of Chapter 10 – Groundwater. As discussed in Section 10.5.3 to Chapter 10 – Groundwater, the numerical groundwater modelling has also demonstrated that Project influence on groundwater flow directions diminishes to effectively nil at the Tooloombah – Deep Creek confluence, which is only 2.2km downstream of the Project, where the theoretical seawater interface surface would be below -280 mAHD, which is well beneath the predicted extent of drawdown. At the Ogmore bridge and WMP29 bore locations, both well outside the drawdown extent, and approximately 4km downstream of the Project, the theoretical fresh-seawater interface is still at least -40 to -80 mAHD. Any fresh-seawater interface at a shallower depth closer to the coast is well beyond the influence of the drawdown zone and any influence of the Project on groundwater flow direction.

In assessing this issue, CQC has drawn upon a large number of sampling bores and events (21 sites at 30 rounds each, and a further 30 sites drilled in 2018 and sampled 8 times), covering the full spectrum of hydrostratigraphic units. However, the nested bores nearer to the coast discussed in more detail in Section 10.5.3 to Chapter 10 (WMP29A-E) provides sample data demonstrating the lack of a freshwater-seawater interface, from the surface alluvium down to the Permian Back Creek Group.

HydroAlgorithmics (Appendix A6c) undertook a review of available groundwater quality datasets, and found there is no idealistic freshwater-saline groundwater interface evident, which they concluded is not unexpected given the geological and geomorphological history of the region, confirming the above findings.

Regarding hydrological changes to surface flows, WRM (Appendix A5b) completed surface water modelling of the existing environment and likely changes to baseline conditions as a result of the

Project. They found that the Project is not expected to result in any major changes to the natural hydrological conditions of Tooloombah and Deep Creeks, and therefore nor to the Styx River. While some runoff within the creek catchments will be captured and retained on site within the mine footprint, the amount of water involved is minimal compared with that entering the creeks as runoff from the broader catchment. In this regard, the existing ephemeral nature of the creeks and the current flow regime will remain unchanged.

Surface water modelling also predicted that there will be no substantial change to the number of 'no flow' days in the system under a mining scenario. Downstream areas will continue to be primarily influenced by the tidal regime of the Styx River estuary and Broad Sound marine environment. This, combined with the minimal reduction in hydrological regime and the large downstream influence of tides, suggests there will be no change in the location of the freshwater – saltwater interface within surface waters of the Styx River.

In summary then, there will be no changes to the groundwater interface (where it exists) as a result of the Project.

3.6.4.3.10 Surface water

The Department does not consider the surface water model is adequate to predict the likely impacts on sensitive receptors, including MNES, both within and downstream of the project site. In particular, the lack of confidence in the surface water model predictions arises from:

- *a lack of local streamflow gauging data*
- *no site-specific information on the current state of the project site, including flood heights and frequency, and current runoff amounts*
- *no consideration of the uncertainty in the regional parameterisation*
- *the current bore monitoring network is not adequate to understand the nature of the surface water system and*
- *the timeframe over which the bores were monitored is not adequate.*

The Department considers the annual water balance is unclear and is contingent on uncertain model inputs (i.e. groundwater flows). There is no detailed discussion of whether water extraction from creeks is required, including an input-output statement. The proponent has not undertaken an assessment of impacts on downstream values that may occur as a result of potential changes in flow regimes from water extraction rates and timing of those extractions.

The Department considers the AEIS does not adequately demonstrate how the proposed action will have a net benefit for the GBR, as stipulated in the objectives of the Reef 2050 Long-Term Sustainability Plan (2015), and Net Benefit Policy. The proponent has not undertaken calculations, or set parameters or targets, for water quality outcomes for the proposed action.

The AEIS does not include an impact assessment of potential flooding of the coal conveyor and its potential impacts on downstream surface water quality, including on the GBRWHA. The proponent notes this impact assessment will be undertaken during the final design of the coal conveyor. The Department considers the inclusion of this assessment in the AEIS is necessary in order for the potential impacts from the proposed action to be understood.

The Department notes no site investigation of potential acid sulphate soils (PASS) on the project site, particularly within the zone of predicted drawdown, or in the surrounding region, has been undertaken by the proponent to inform an impact assessment on surface water quality. As such, the

Department considers the proponent has not adequately demonstrated that the PASS will not impact on surface water quality as a result of the proposed action.

CQC response

The Department does not consider the surface water model is adequate to predict the likely impacts on sensitive receptors, including MNES, both within and downstream of the project site. In particular, the lack of confidence in the surface water model predictions arises from:

- *a lack of local streamflow gauging data*

Stream flow gauges that have been installed since the last SEIS (v2) and have been recording flow since mid October 2019. From this, stream flow estimates have been determined for both creeks (as detailed within the Flood Study and Site Water Balance in Appendix A5b). This data has been used to obtain an improved understanding of local runoff characteristics and the behaviour of persistent pools during dry weather.

- *no site-specific information on the current state of the project site, including flood heights and frequency, and current runoff amounts*

Revised flood modelling has been conducted, as presented in the Flood Study and Water Balance in Appendix A5b, including flood heights. Evidence of flooding following the 2010-2011 flood event was also noted during the ALS Water Sciences Group Baseline Aquatic Survey in June 2011 (Appendix A10b) with debris in trees found 7-8 m above the measured water level at that time.

Otherwise, the flood modelling has been conducted taking account of local and regional climatic and catchment characteristics and addressed for local and regional variation in rainfall characteristics. Flood modelling was conducted by WRM Water and Environment using industry best practice methods for the generation of flood extents and impacts across the Project site.

- *no consideration of the uncertainty in the regional parameterisation*

A specific consideration of the uncertainty in the regional parameterisation in the modelling was conducted as part of the Flood Study and Site Water Balance in Appendix A5b, particularly Section 6 of the report. This included validation against the local streamflow gauges and the closest stream gauge at Marlborough Creek (Gauge no. 130009A). Variation in rainfall across the catchment is discussed in Section 3.3.2 of the report.

- *the current bore monitoring network is not adequate to understand the nature of the surface water system and*
- *the timeframe over which the bores were monitored is not adequate.*

Given that this comment relates to surface water, it is not clear whether the Department is instead referring to water monitoring sites, or to groundwater sites in how they interact either with surface water systems (surface-groundwater interactions) or in relation to the freshwater-seawater interface.

Regarding the surface water network, water quality monitoring data has been collected in the Styx River catchment since 2008, at the locations shown in Figure 9-1 of Chapter 9 – Surface Water, and from the following sources:

- January 2008 to March 2012 – 21 discrete monitoring events by the FBA covering mostly storm events
- June 2011 to July 2012 – 12 approximately monthly events by CQC covering several storm events and otherwise mostly baseflow events and

- February 2017 to the present – 37 approximately monthly events by CQC up to 28 May 2020 (for the purposes of this assessment), predominantly 'no flow' events – that is, events with little to no discernible longitudinal flow along the creeks, due to the extended dry conditions.

Table 9-2 of Chapter 9 shows the number of events per site and the period of measurement. The overall program has excellent coverage of the main Project site and lease area, with locations upstream and downstream. Sites with >24 sampling events are located along both Tooloombah and Deep Creeks, the confluence of both creeks and at the Ogmore Bridge, representing both upstream, adjacent and downstream reaches of these creeks in relation to the Project. Reference sites on Montrose and Granite Creeks have a good number of events recorded, close to the QWQG recommended 18 rounds.

This has been supplemented with further surface water characterisation, including continuous streamflow monitoring in Tooloombah and Deep creeks, as detailed within the Flood Study and Site Water Balance in Appendix A5b, and monitoring and inspection of pools within Deep and Tooloombah Creeks.

For groundwater, CQC has collected groundwater samples at 21 bores over 30 monthly events, and at a further 30 bores drilled in 2018 over 8 monthly events. The bores cover the full spectrum of hydrostratigraphic units. As such, given the spread of the bores sampled, and the timeframe samples are spread over (2.5. years), the monitoring network is considered adequate, both spatially and temporally. Data from these bores has been used in several studies (including the Surface Water/Groundwater Interactions Report in Appendix A6d and Groundwater Model and Assessment Report in Appendix A6b), and the data used in determining interactions and connections between surface and groundwater (see for example Section 10.3.7 of Chapter 10 – Groundwater). With respect to the freshwater-seawater interface, no physical interface can be identified in the data that could be affected by the project.

The Department considers the annual water balance is unclear and is contingent on uncertain model inputs (i.e. groundwater flows). There is no detailed discussion of whether water extraction from creeks is required, including an input-output statement. The proponent has not undertaken an assessment of impacts on downstream values that may occur as a result of potential changes in flow regimes from water extraction rates and timing of those extractions.

The site water supply strategy is based on the recycling of water captured within the mine water management system and is detailed in both Chapter 9 – Surface water (Section 9.4) and the draft Mine Site Water Management Plan (Appendix A5c). No water extraction from creeks is required. The site water balance model indicates that the site may experience a small water supply shortfall under some climatic conditions, but otherwise will generally be able to supply water entirely from on-site storages. An adaptive management approach will be used to deal with dry conditions on site to ensure minimal interruptions to operations due to water supply limitations, without additional sourcing of water. Advanced dewatering within the open cut footprint could provide a potential source of water to meet any shortfall during dry conditions. In addition, production rates and process methods can be adjusted to reduce water use (for example, by increasing the volume of bypass coal).

Groundwater inputs have been provided as part of the revised numerical groundwater model presented in Appendix A6b and summarised in Chapter 10 – Groundwater (Section 10.5.1.1).

Furthermore, the Project is not expected to result in any major changes to the natural hydrological conditions of Tooloombah and Deep Creeks, and therefore also not to any downstream values.

While some runoff within the creek catchments will be captured and retained on site within the mine footprint, the amount of water involved is minimal compared with that entering the creeks as runoff from the broader catchment (see Chapter 9 – Surface Water). In this regard, the existing ephemeral nature of the creeks and the current flow regime will remain unchanged, and connectivity along the creek systems and into the downstream environments will not be affected.

Surface water modelling also predicted that there will be no substantial change to the number of 'no flow' days in the system under a mining scenario. Tooloombah and Deep Creek are ephemeral and only flow for 24% of the time. Therefore, for 76% of the time there is no influence of Tooloombah or Deep Creek, which could affect the tidal limit, on the downstream environment. The amount of flow days will not change as a result of Project operations (see Section 9.6.2.1 of Chapter 9 – Surface Water). Downstream areas will continue to be primarily influenced by the tidal regime of the Styx River estuary and Broad Sound marine environment.

The Department considers the AEIS does not adequately demonstrate how the proposed action will have a net benefit for the GBR, as stipulated in the objectives of the Reef 2050 Long-Term Sustainability Plan (2015), and Net Benefit Policy. The proponent has not undertaken calculations, or set parameters or targets, for water quality outcomes for the proposed action.

CQC commissioned ELA to complete a revised assessment of Project impacts on aquatic ecology, marine ecology and the GBR (Appendix A10a), and Engeny to complete a detailed Sediment Loads Assessment (Appendix A15b). The assessments found that impacts on these values were unlikely. Regarding sediment loads, the Project will result in a positive contribution to the sediment load targets in the Reef 2050 Plan through the expected reduction in sediment load reporting to Tooloombah Creek and Deep Creek associated with the cessation of grazing activities and subsequent managed regeneration of native vegetation on the majority of the Mamelon property. The sediment load assessment using average climatic conditions indicates that at least 95% of sediments up to 0.045 mm diameter would be captured and retained within the site under typical flow conditions through rapid settlement of coarse-grained particles during all storm events and settlement of fine-grained particles under controlled conditions. The Project will reduce the estimated baseline sediment generation rate of 5,037 t/year to approximately 2,297 t/year. This equates to a reduction in the total Styx Basin sediment load of 2.74 % and a reduction in the total Fitzroy Basin sediment load of 0.15%. The assessment also considered non-average, very wet, climatic conditions when sediment might be expected to mobilise more readily and found that, even under non-average wet and very wet conditions, the sediment load from the Project will be less than that of current baseline conditions.

The lack of changes in hydrological conditions and downstream water quality due to the Project (for other analytes) discussed above, and in detail in the response to Comment 1 (Section 3.6.1.1), further demonstrates this lack of impact.

The AEIS does not include an impact assessment of potential flooding of the coal conveyor and its potential impacts on downstream surface water quality, including on the GBRWHA. The proponent notes this impact assessment will be undertaken during the final design of the coal conveyor. The Department considers the inclusion of this assessment in the AEIS is necessary in order for the potential impacts from the proposed action to be understood.

The proposed coal conveyor is located outside the Deep Creek main channel flood extent for the 0.1% AEP flood event. An excavated underpass will be required to cross the Bruce Highway. The design of the underpass will ensure no interaction with floodwaters. The conveyor will traverse

some areas of the Deep Creek floodplain that are subject to shallow inundation (up to about 1 m) during major flood events. The conveyor can be designed to avoid interaction with floodwaters by elevating the conveyor above flood level.

The Department notes no site investigation of potential acid sulphate soils (PASS) on the project site, particularly within the zone of predicted drawdown, or in the surrounding region, has been undertaken by the proponent to inform an impact assessment on surface water quality. As such, the Department considers the proponent has not adequately demonstrated that the PASS will not impact on surface water quality as a result of the proposed action.

Section 5.3.6 of Chapter 5 – Land provides a detailed assessment of the likelihood of acid sulfate soils (ASS), either actual (AASS) or potential (PASS) within the Project disturbance area and within the groundwater drawdown extent. Based on existing risk mapping, topographic levels in the area, and both geological, geomorphological and soils investigation results, the assessment concluded that there is no evidence for ASS in the area, and that there is no justification for detailed ASS or PASS investigations (based on Dear et al. 2014).

3.6.4.3.11 Final landform

The Department considers the proponent has not provided adequate detail, with supporting evidence, on the proposed construction and management of the final landform to ensure it does not pose an ongoing risk to the downstream environment, including the GBRWHA. The AEIS does not explain how the factors relevant to the final landform (i.e. soil characteristics, landform design, controls, etc.) have been considered to minimise erosion, contamination, and manage dispersive and erosive soil.

The proponent is proposing to backfill the final voids with coarse and fine coal rejects, which the Department considers will provide an additional source of contaminants that could be mobilised in groundwater. The Department considers the proponent has not adequately addressed this risk in the AEIS, including assessing alternate final landform options.

The Department considers that just a commitment to develop and implement a Rehabilitation Framework, PRCP, and ESCP, without providing specific detail to manage impacts, is not adequate (see comment 3 below).

CQC Response

The Department considers the proponent has not provided adequate detail, with supporting evidence, on the proposed construction and management of the final landform to ensure it does not pose an ongoing risk to the downstream environment, including the GBRWHA. The AEIS does not explain how the factors relevant to the final landform (i.e. soil characteristics, landform design, controls, etc.) have been considered to minimise erosion, contamination, and manage dispersive and erosive soil.

Chapter 11 – Rehabilitation and Decommissioning has been completely revised for this SEIS and presents the rehabilitation and closure strategy for the Project, including an assessment and description of soil management and rehabilitation methods, a description of the planned progressive rehabilitation and revegetation of areas across the mine site and rehabilitation monitoring and maintenance requirements.

A new technical assessment report was commissioned to specifically address final landform stability, provided in Appendix A3c. Landforming for long term safe, stable and non-polluting landforms is detailed in Section 11.9.2 of Chapter 11 – Rehabilitation and Decommissioning. These documents

consider the properties of soils, waste rock and rejects and landform characteristics in ensuring the long term stability of the landforms.

The Geochemical Assessment in Appendix A3b concluded that leachate from bulk mine waste materials exposed to oxidising conditions would have a pH in the range 8.5 to 9.5; a low to moderate salinity; very low acidity (with net positive alkalinity); be dominated by sodium, chloride and sulfate ions, with very low calcium, magnesium and potassium; low sulfate (compared to ANZG default guideline values); and low metal / metalloid concentrations, with the exception of aluminium, arsenic, molybdenum and selenium, and to a lesser extent zinc and vanadium, in some of the samples. The Groundwater Model and Assessment Report in Appendix A6b, as summarised in Section 10.5.2 of Chapter 10 – Groundwater, concludes that no deleterious effect in terms of water quality from waste rock and rejects would occur to groundwater.

The soil management measures outlined in Chapter 5 – Land and waste rock and rejects management in Chapter 8 – Waste Rock and Rejects and Chapter 11 – Rehabilitation and Decommissioning specifically consider the management and mitigation of sodic soil impacts as part of stripping, stockpiling and rehabilitation works, including amelioration to avoid excessive erosion of sodic soils and materials.

The Department considers that just a commitment to develop and implement a Rehabilitation Framework, PRCP, and ESCP, without providing specific detail to manage impacts, is not adequate (see comment 3 below).

A PRCP was not required as part of the ToR for the Project. However, in light of the recent commencement of the new financial provisions and rehabilitation requirements, this SEIS includes information which is typically required for inclusion within a PRCP. A formal PRCP will be developed at a later date based on the objectives and goals presented within this SEIS which seek to provide predetermined land uses for the different land units (domains) of the mine (see Section 11.11 of Chapter 11.

The strategy presented in Chapter 11, to be incorporated into the Environmental Authority (EA) and the PRCP, will be finalised and require approval prior to the commencement of mining operations. Specific rehabilitation and decommissioning measures to avoid or minimise any impacts will be identified and the PRCP will be reviewed and updated during the mining life. The PRCP will be continuously updated during operations to ensure closure matters are appropriately addressed prior to the commencement of mine closure activities.

The proponent is proposing to backfill the final voids with coarse and fine coal rejects, which the Department considers will provide an additional source of contaminants that could be mobilised in groundwater. The Department considers the proponent has not adequately addressed this risk in the AEIS, including assessing alternate final landform options.

As noted above, the Geochemical Assessment in Appendix A3b concluded that leachate from bulk mine waste materials, including coal rejects, would have a pH in the range 8.5 to 9.5; a low to moderate salinity; very low acidity (with net positive alkalinity); be dominated by sodium, chloride and sulfate ions, with very low calcium, magnesium and potassium; low sulfate (compared to ANZG default guideline values); and low metal / metalloid concentrations, with the exception of aluminium, arsenic, molybdenum and selenium, and to a lesser extent zinc and vanadium, in some of the samples. The Groundwater Model and Assessment Report in Appendix A6b, as summarised in Section 10.5.2 of Chapter 10 – Groundwater, concludes that no deleterious effect in terms of water quality from waste rock and rejects would occur to groundwater, given these results.

Note that coal rejects are proposed to be co-disposed with waste rock within the waste rock stockpiles or in-pit, below the final landform surface, and so will be encapsulated within the final landforms and not re-disturbed following reworking of stockpile and pit areas during rehabilitation.

3.6.4.4 Comment 3

TOR Category or EIS Chapter		Submitters Reference to EIS Section (if provided)	Water resources – Monitoring, Mitigation and Management Sections in AEIS: 16.10, 16.11 and 16.15
Submitters Reference (if provided)	Comment 3: Water Resources - Monitoring, Mitigation and Management		

Details of the Submission

Not adequately addressed - submissions 2, 14 and 21

The Department considers the measures proposed to monitor, mitigate and manage surface and groundwater, sediment and erosion, supplementary flows and the offset site are not adequate to monitor, mitigate and manage the potential impacts of the proposed action on MNES. The Department considers the effectiveness of the proposed measures are unable to be determined due to the:

- lack of detailed descriptions of the measures
- lack of supporting field information and baseline data
- lack of scientific evidence or examples to support the effectiveness of the proposed measures and
- inadequacy of characterising all potential impacts of the proposed action (see comment 2 above).

Management plans

The Department considers that a commitment to develop and implement management plans to mitigate and manage potential impacts, without providing specific detail as to the proposed content of the plans, is not adequate.

Further, the Department does not consider a commitment to undertake “further investigation” is a mitigation or management measure. The Department considers that the collection of relevant baseline data should be undertaken concurrently with the environmental assessment process and prior to a decision by the delegate as to whether or not the proposed action should be approved.

Supplementary flows

The Department considers the AEIS does not contain sufficient information regarding the implementation and effectiveness of supplementary flows to manage groundwater drawdown impacts on groundwater-dependent ecosystems (GDEs). As noted in comment 1, the Department has low confidence in the groundwater model predictions whilst noting there is a lack of site-specific data to inform the feasibility of supplementary flows.

In particular, the following information has not been provided:

- the identification of GDEs that may require supplementary flows, their preferred source of water and the seasonal characteristics of groundwater

- an analysis of the nature of surface water-groundwater connectivity
- an analysis of water availability, potential sources of supplementary water, and suitability of water quality of potential sources
- an assessment of the potential impacts on the water quality of the alluvial aquifer due to recharge from the supplementary flows
- determination of the volumes and discharge rates of supplementary flows to maintain GDEs and
- preparation of an adequate monitoring program that identifies when supplementary flows were needed and evaluates their effectiveness.

The AEIS notes that if this proposed management measure were not to be successful, there would be high risks of adverse impacts on GDEs. The Department notes that no alternate management measure/s has been identified or assessed by the proponent to manage groundwater impacts on GDEs.

Further, the Department considers that a commitment to develop and implement a Receiving Environmental Management Plan (REMP), without providing specific measures to manage impacts on GDEs, is not adequate.

Proposed monitoring framework

The Department considers the proposed monitoring framework is not adequate to identify and monitor impacts or trigger suitable management measures. The Department considers key deficiencies of the proposed monitoring framework include:

- the baseline surface water quality data is inadequate, and there is no seasonal and inter-annual variability information
- no proposed surface water quality monitoring post-closure to monitor erosion of the proposed final landform (proposed to comprise sodic and highly erosive soils)
- no proposed long-term monitoring to detect potential saltwater intrusion
- the proposed long-term surface water quality monitoring is not adequate
- no proposed long-term monitoring of PASS downstream of the project site, including within and outside (i.e. in the intertidal zone) of the predicted zone of groundwater drawdown
- no proposed monitoring of supplementary flows to assess their effectiveness and success
- no TARPs (Trigger, Action, Response Plans) have been provided
- the proposed upstream locations of surface water monitoring sites are not appropriate because there is only one site for each creek and the data from the sites will be impacted by mine runoff
- the early warning capability of the monitoring network is inadequate
- the groundwater monitoring network is inadequate, and there are no compliance or reference bores to the north and/or north-east of the project site to target the Basement aquifer, and no reference bores to the east of the project site to target all aquifers and
- inconsistency in the long-term monitoring approach of post-mining impacts from the final landform.

Further, the Department considers that a commitment to develop and implement a REMP, Rehabilitation Framework and ESCP to manage impacts on water resources, without the specific details, is not adequate.

Suggested Solutions, Recommendations and Conditions

See comment 2.

Based on the information in the AEIS, the Department considers there is insufficient information to inform any proposed conditions of approval.

The Department therefore considers the proponent has not adequately responded to submissions 2, 14 and 21.

Proponent Response

3.6.4.4.1 Not adequately addressed - submissions 2, 14 and 21

CQC note that submission 2, 14 and 21 said:

Submission 2:

Proposed management of the potential impacts of groundwater on groundwater-dependent ecosystems, including riparian habitat suitable for EPBC listed threatened species and communities (p16-68).

Recommendation

Provide more detail, with an assessment of their effectiveness, of the measures that will be implemented to ensure that the riparian habitat that is likely to provide habitat for listed threatened species and communities is not degraded and/or permanently lost due to groundwater drawdown.

The Department notes that the current measures only involve ongoing assessment and monitoring of the stream health, hydrological function and riparian vegetation. The Department notes that there are minimal measures proposed in regards to what actions will be undertaken by the proponent if the groundwater drawdown is likely to or results in the degradation and/or loss of the riparian habitat.

The Department considers that any degradation and/or loss of this riparian habitat would require an offset in accordance with the Department's Environmental Offsets Policy (2012).

CQC Response

As outlined in the response to DAWE Comment 1 (Section 3.6.4.2, above), based on the results of a worst case scenario impact assessment presented in Section 16.10.1.2 of Chapter 16, it is concluded that groundwater drawdown would result in at least a 'Possible' likelihood of there being a 'Minor' impact on Terrestrial GDEs within three stream reaches along Deep Creek. The area predicted to be potentially affected consists of 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4

The assessment demonstrates that impacts on vegetation as a result of groundwater drawdown are likely to vary in scale along the different stream reaches. For the majority of the 165-ha expected to be affected, impacts are likely to manifest as a gradual reduction in BioCondition scores, canopy cover and canopy height. In some areas vegetation may no longer meet the Regional Ecosystem description, however, will continue to provide ecosystem services, including minimising erosion and some fauna habitat, but with elevated weed cover.

Based on this assessment, the complete loss of vegetation and ecosystem services, including bank stability, is considered highly unlikely to occur at either Tooloombah or Deep Creek. This result,

combined with a study of geomorphological values, indicates that bank collapse is unlikely to occur as a result of the Project.

The impact assessment for threatened ecological communities and threatened and migratory species considers the potential impacts of groundwater drawdown on habitat for these species. These assessments are presented in Chapter 16 – Section 16.10.2 and 16.10.3.

The impact assessment for threatened and migratory species considers the potential impacts of groundwater drawdown on habitat for these species and is presented in Chapter 16 – Section 16.10.3. A total of 11 MNES species are considered known or likely to occur within the Project Site or Near Surrounds. Of these 11 species, the impact assessment concludes that habitat for three species within the 165 ha of riparian vegetation that has the potential to be impacted by groundwater drawdown will be significantly impacted based on the application of the MNES Significant Impact Guidelines 1.1 (DE 2013a), despite the implementation of a range of mitigation and management measures. These species are greater glider, koala and squatter pigeon.

As described in the response to DAWE Comment 1 (see Section 3.6.4.2), based on the application of conservative assumptions, it is possible that the area to be affected may be substantially less than 165.23 ha. In addition, the vegetation will continue to provide ecosystem services, including minimising erosion and some fauna habitat, however, microhabitat features for fauna, such as hollows, may become limited.

These potential impacts will be mitigated and managed through the implementation of a range of actions outlined in the Project's EMP and relevant sub-plans. The plans of particular importance for impacts of the Project on greater glider, squatter pigeon and koala habitat are the Draft Significant Species Management Plan (SSMP, see Appendix 9e) and the Draft GDEMMP (see Appendix 10e).

The purpose of the Draft SSMP is to reduce the environmental impacts of the Project on listed species and their habitat, through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and as part of the decommissioning process.

The Draft GDEMMP describes the mitigation and monitoring measures that will be implemented to manage the impacts of the Project on GDEs. A series of triggers and corrective actions have been developed for each GDE, including Terrestrial GDEs, to facilitate an assessment of the impacts of the Project during various development stages, and to inform an assessment of the suitability of mitigation measures to manage impacts. An adaptive management approach will be implemented, with the results of monitoring relevant indicators for each GDE informing the ongoing re-evaluation of Project impacts and associated mitigation measures.

As part of the GDEMMP, the potential impacts of groundwater drawdown on riparian vegetation along Deep Creek will be mitigated through the implementation of a revegetation program with the aim of building ecological resilience. Revegetation will include expansion of the existing riparian corridor by a width of 10 m. A revegetation program will be designed to ensure the planting of drought tolerant species of similar ecological function as those with the potential to be impacted. This will ensure that existing habitat for terrestrial species is maintained, as well as reducing the potential for consequential impacts such as erosion and sedimentation which may be associated with vegetation loss. The revegetation program will be implemented from Project commencement ensuring sufficient timeframes for establishment of vegetation, given potential impacts are not expected to commence until at least 10 years after Project commencement.

In addition, because the impacts of groundwater drawdown on habitat for greater glider, koala and squatter pigeon are considered to be significant, offsets are also proposed to be delivered. Accordingly, CQC has prepared a Biodiversity Offset Strategy to provide a detailed account of how the Project's anticipated offset requirements will be acquitted and CQC's approach to delivering these offsets. The Biodiversity Offset Strategy is included in Appendix 11a. Details of the proposed offsets for the unavoidable significant residual impacts on greater glider, koala and squatter pigeon habitat are also summarised in Section 16.13 of Chapter 16.

Submission 14:

Specificity of mitigation and management measures, with references to relevant MNES.

Recommendation

Provide further detail on the proposed mitigation and management measures to manage the relevant impacts of the action on MNES, including impacts on the attributes of the OUV criteria. Resources that may assist include, but not limited to:

- *relevant conservation advices, threat abatement plans and recovery plans for listed threatened species and ecological communities;*
- *The Reef 2050 Long-Term Sustainability Plan (2015);*
- *the Department's SPRAT database; and*
- *relevant Departmental documents, policies and guidelines.*

This section should not provide a full discussion of the project's avoidance, mitigation and management measures (with a reference to other relevant EIS chapters). The proposed measures need to be discussed specific to each MNES with information sourced from other EIS chapters to reinforce the measures' appropriateness to mitigate and manage impacts.

CQC Response

Section 16.10 of Chapter 16 includes a revised assessment of the Project impacts on MNES. As a result of the impact assessment presented in Section 16.10, the results of the significant residual impacts on MNES are presented in Table 3-14. The Project will result in significant residual impacts on habitat for greater glider, koala, squatter pigeon and ornamental snake.

Table 3-14: Summary of Significant Residual Impacts to MNES

MNES	Significant Residual Impact Conclusion	Significant Residual Impact Area (ha)		Offset to be Provided
Listed threatened species	As presented in Section 16.10.3 of Chapter 16, the Project will result in a significant residual impact on habitat for species listed as Vulnerable under the EPBC Act including greater glider, koala, squatter pigeon and ornamental snake.	Greater glider	281.0	Land based offset under EPBC Act Offset Policy
		Koala	324.6	
		Squatter pigeon	306.6	
		Ornamental snake	18.8	
Listed Migratory Species	As presented in Section 16.10.3 of Chapter 16, the Project will not result in a significant residual impact on listed migratory species under the EPBC Act.			
Threatened ecological communities	As presented in Section 16.10.2 of Chapter 16, the Project will not result in a significant residual impact on a TEC listed under the EPBC Act.			
World Heritage Properties	As presented in Section 16.10.4.5 of Chapter 16, the Project will not result in a significant residual impact on the GBRWHA.			

MNES	Significant Residual Impact Conclusion	Significant Residual Impact Area (ha)	Offset to be Provided
National Heritage Places	As presented in Section 16.10.4.5 of Chapter 16, the Project will not result in a significant residual impact on the GBR National Heritage Place.		
Great Barrier Reef Marine Park	As presented in Section 16.10.4.5 of Chapter 16, the Project will not result in a significant residual impact on the GBRMP.		
Wetlands of international importance (listed under the Ramsar Convention)	No Ramsar Wetlands under the EPBC Act are located within the Project Area. The closest Ramsar wetlands are the Shoalwater and Corio Bays which are adjacent to the Broad Sound wetland. The Project will not result in a significant residual impact on any wetlands of international importance.		
Commonwealth marine areas	Coral Sea Marine Park is the closest Commonwealth marine area. It covers 989,836 square kilometres and lies off the coast of Queensland, and is one of the world's largest marine parks. The Coral Sea Marine Park boundary is located approximately 330 km north-east of the Project Area. The Project will not result in a significant residual impact on the Coral Sea Marine Park.		
Water Resources	As presented in Section 16.10.7.2, the Project will not result in a significant residual impact on a water resource.		

Mitigation, management and monitoring measures for impacts on MNES are summarised in Section 16.12 of Chapter 16. A draft EMP is contained in Appendix 12 and has been developed to manage and mitigate potential environmental impacts, and to assist CQC to comply with relevant environmental approvals and permit conditions. The draft EMP has been prepared generally in accordance with the Commonwealth Environmental Management Plan Guidelines (Commonwealth of Australia 2014) and is modelled on the AS/NZS ISO 14001 (Standards Australia 2016) Plan-Do-Check-Act (PDCA) continual improvement model.

Appendix C of the draft EMP provides the specific, sub-plans for managing environmental impacts. The following sub plans are relevant to MNES:

- General Acid Sulfate Soil Management Plan (ASSMP)
- Hazardous Materials Management Plan (including spill management) (HMMP)
- Land Use Management Plan (LUMP), including:
  - Biodiversity Management Strategies
  - Weed and Pest Management Plan (WPMP)
  - Bushfire Management Plan (BfMP)
- Mineral Waste Management Plan (MWMP)
- Surface Water Management Plan (SWMP) and
- Groundwater Management and Monitoring Plan (GMMP).

The management plans in Appendix C of the draft EMP are high-level at this stage and will be updated following Project approval to reflect the final Environmental Authority (EA) and EPBC Act Conditions.

In addition to the plans in Appendix C of the draft EMP, a number of more detailed management plans have been prepared in response to the government submissions on SEIS v2. These are referenced by the draft EMP and will be enshrined into the final EMP as sub-plans. The following key detailed plans are also relevant to MNES:

- Draft Mine Site Water Management Plan (WMP – Appendix A5c) – The Draft WMP describes the procedures that will be implemented to manage water within the Project Site, to provide

sufficient water for construction and operation of the mine, while also outlining how excess water will be managed, sourced from rainfall or from groundwater seepage into the mine pits.

- Draft Erosion and Sediment Control Plan (ESCP – Appendix A15a) – The Draft ESCP describes the approach to managing the risk of erosion at the site, and the methods that will be used to capture and manage sediment, to reduce discharges to the receiving environment.
- Draft Receiving Environment Monitoring Program (REMP – Appendix A10f) – The Draft REMP describes the rationale and salient aspects of a monitoring program for the receiving environment surrounding the Project Site, including the location of monitoring sites, monitoring frequency and parameters. The REMP is designed to evaluate changes in the quality of the receiving environment, with a focus on surface water quality, sediment quality, aquatic ecology habitat quality, marine ecology habitat quality, macroinvertebrates and fish. Several control and impact sites have been established upstream of, adjacent to, and downstream of the Project.
- Draft Significant Species Management Plan (SSMP – Appendix A9e) – The purpose of the Draft SSMP is to reduce the environmental impacts of the Project on listed species and their habitat, through the development of mitigation and monitoring measures for implementation prior to construction, during construction, during operations and as part of the decommissioning process.
- Draft GDE Management and Monitoring Plan (GDEMMP – Appendix A10e) – The Draft GDEMMP describes the mitigation and monitoring measures that will be implemented to manage the impacts of the Project on GDEs. A series of triggers and corrective actions have been developed for each GDE, to facilitate an assessment of the impacts of the Project during various development stages, and to inform an assessment of the suitability of mitigation measures to manage impacts. An adaptive management approach will be implemented, with the results of monitoring relevant indicators for each GDE informing the ongoing re-evaluation of Project impacts and associated mitigation measures.
- Progressive Rehabilitation and Closure Plan (PRCP) – A rehabilitation framework has been developed which will be developed into a PRCP. The framework describes how final landforms associated with the Project will be rehabilitated after mining activities. Runoff from disturbed areas has the potential to reduce water quality in the receiving environment, with rehabilitation a key management measure to address this risk in the long term.

Measures to minimise, mitigate and monitor impacts on MNES, will be delivered through the implementation of the EMP and the sub-plans outlined above. It is important to note that the EMP and sub-plans are currently in draft form and will be finalised following Project approval to reflect the final EA and EPBC Act Conditions. This will involve consolidation of all mitigation, management and monitoring measures proposed throughout the SEIS chapters and plans into the EMP and sub-plans. Specific measures from the EMP and sub-plans to be implemented, and relevant to this chapter, are summarised below. For complete details of all mitigation measures refer to the plans.

Offsets for the unavoidable impacts of the Project on greater glider, koala, squatter pigeon and ornamental snake are described in Section 16.13 of Chapter 16. The Project's Biodiversity Offset Strategy is provided in Appendix 11a.

Submission 21:

Water Resources Assessment and response to the advice from the Independent Expert Scientific Committee on Coal Seam Gas and Coal Mining Development (IESC).

The Department considers that the project has the potential to impact on water resources, particularly through:

- *changes to groundwater/surface water interactions from groundwater drawdown including the alteration of watercourse flow regimes and the loss of permanent discharge pools which may provide potential habitat for nationally listed aquatic species*
- *exposure of potential acid sulphate soils (PASS) in stream beds as a result of groundwater drawdown*
- *changes to water quality from mining operations and the release of mine-affected water into surface watercourses*
- *the disruption of aquifers and the alteration of the groundwater/salt water interface near the coast from groundwater drawdown*
- *the degradation and potential loss of ground-water dependent ecosystems (GDEs) along major watercourses due to groundwater depressurisation and the severing of base flow*
- *changes to surface water quality and surface water hydrological regimes as a result of extreme flooding events and*
- *changes to surface water and reef water quality from increased sediment and pollutants entering surface water systems.*

Recommendation

- *Include a detailed response to the IESC comments on the draft EIS in the supplementary EIS.*

CQC Response

See response regarding submission 21 in Section 3.6.4.2.1, above.

3.6.4.4.2 The Department considers the measures proposed to monitor, mitigate and manage surface and groundwater, sediment and erosion, supplementary flows and the offset site are not adequate to monitor, mitigate and manage the potential impacts of the proposed action on MNES. The Department considers the effectiveness of the proposed measures are unable to be determined due to the:

CQC Response

As part of this SEIS v3, a number of further detailed assessments have been prepared, including:

- A revised and updated numerical groundwater model (Appendix A6c), water balance, flood modelling, streamflow and pools balance, fluvial geomorphology assessment (Appendices A5b, A5d)
- Ecological and GDE assessments (Appendices A10a)
- Surface water / groundwater interactions (Appendix A6d), and sediment loads assessment (Appendix A15b)

These have been informed by a number of other assessments, including Transient Electromagnetic Survey (Appendix A6f), Fluvial Geomorphology (Appendix A5d), and surface and groundwater quality data review and collation (Appendices A5a and A6c).

From this, CQC have commissioned and developed a number of specialist management plans, to specify and document the proposed management system, including:

- Draft Environmental Management Plan (EMP) (Appendix A12)

- Draft Erosion and Sediment Control Plan (ESCP) (Appendix A15a)
- Draft Mine Site Water Management Plan (WMP) (Appendix A5c)
- Draft Groundwater Dependent Ecosystem Management and Monitoring Plan (GDEMMP) (Appendix A10e)
- Draft Receiving Environment Monitoring Program (REMP) (Appendix A10f)
- Significant Species Management Plan (SSMP) (Appendix A9e).

Appendix C of the draft EMP contains draft environmental management sub-plans for construction and operational impacts. These sub-plans have been prepared based on the environmental risks and commitments identified in the SEIS v3. These sub-plans will be reviewed and updated with comprehensive and detailed site-specific management procedures after approval of the Project.

The draft sub-plans are as follows:

- Appendix C1 – Generic Acid Sulfate Soil Management Plan (ASSMP)
- Appendix C2 – Air Quality Management Plan (AQMP)
- Appendix C3 – Greenhouse Gas Management Plan (GHGMP)
- Appendix C4 – Hazardous Materials Management Plan (including spill management) (HMMP)
- Appendix C5 – Land Use Management Plan (LUMP), including:
  - Land and Soils Management Plan
  - Biodiversity Management Strategy
  - Weed and Pest Management Plan (WPMP)
  - Bushfire Management Plan (BfMP)
- Appendix C6 – Mineral Waste Management Plan (MWMP)
- Appendix C7 – Noise and Vibration Management Plan (NVMP)
- Appendix C8 – Waste Management Plan (WSTMP)
- Appendix C9 – Surface Water Management Plan (SWMP)
- Appendix C10 – Groundwater Management and Monitoring Plan (GMMP)
- Appendix C11 – Biting Insect Management Plan (BIMP)

A rehabilitation and closure strategy is detailed within Chapter 11 – Rehabilitation and Decommissioning, and is to be incorporated into a Progressive Rehabilitation and Closure Plan (PRCP) including regulatory approval following Project approval. In addition, a Cultural Heritage Management Plan (CHMP) is to be developed, with negotiations underway between CQC and indigenous parties.

Note that CQC has revised the Project description since submission of the SEIS and is no longer proposing to supplement natural stream flows to support aquatic ecosystems and riparian vegetation. Refer to the response to Queensland DAF Comment 1 (Section 3.6.1.1).

A summary of the content of the key management plans are provided in earlier responses to comments, and repeated below for the GDEMMP, REMP, ESCP and WMP:

- The draft REMP describes the rationale and salient aspects of a monitoring program for the receiving environment surrounding the Project Site, including the location of monitoring sites, monitoring frequency and parameters. The REMP is designed to evaluate changes in the quality of the receiving environment, with a focus on surface water quality, sediment quality, aquatic

ecology habitat quality, marine ecology habitat quality, macroinvertebrates and fish. Several control and impact sites have been established upstream of, adjacent to, and downstream of the Project.

- The draft GDEMMP describes the program for monitoring Aquatic and Terrestrial GDEs, including stygofauna, groundwater fed pools/creeks and associated aquatic habitats, riparian vegetation, and their associated groundwater resources. Triggers are outlined which will be evaluated during all stages of the Project, with corrective actions identified for implementation in response to the monitoring results exceeding a trigger level
- The draft ESCP identifies the strategy and measures to be implemented to control erosion and sediment runoff from the site. The plan was prepared and has been certified by a Certified Professional in Erosion and Sediment Control and includes an inspection checklist and Typical Standard Installation Details. This will be updated prior to works commencing and throughout the Project life as needed, to ensure it remains up to date at all times. Installation details are provided in Appendix C to the plan, with the strategy described within the report.
- The WMP details management of the site water system, including the overall strategy for dam management, operating levels, controlled release strategy and monitoring requirements.

The offset area on Mamelon and [redacted] will be managed to achieve a conservation outcome for these MNES and MSES. Interim performance targets and completion criteria to measure the progress towards, and achievement of, the conservation outcomes for the offset matters have been defined in Section 5 of the Mamelon OAMP.

3.6.4.4.3 lack of detailed descriptions of the measures

CQC Response

Refer to the response above.

3.6.4.4.4 lack of supporting field information and baseline data

CQC Response

Refer to the response above.

3.6.4.4.5 lack of scientific evidence or examples to support the effectiveness of the proposed measures and

CQC Response

It is understood this relates to supplementary watering, which as noted above is no longer proposed. Regardless, detailed strategies have been developed for the proposed measures as outlined above.

3.6.4.4.6 inadequacy of characterising all potential impacts of the proposed action (see comment 2 above).

CQC Response

The detailed works commissioned as part of the SEIS v3, as noted in the response to Comments 1 and 2 and other responses to Comment 3 above have allowed for a more detailed assessment and refined response to the potential impacts. This has allowed the characterisation of all potential impacts to be suitably defined.

3.6.4.4.7 Management plans

The Department considers that a commitment to develop and implement management plans to mitigate and manage potential impacts, without providing specific detail as to the proposed content of the plans, is not adequate.

Further, the Department does not consider a commitment to undertake "further investigation" is a mitigation or management measure. The Department considers that the collection of relevant baseline data should be undertaken concurrently with the environmental assessment process and prior to a decision by the delegate as to whether or not the proposed action should be approved.

CQC Response

As noted in the responses above, CQC have developed management plans and mitigation measures to manage potential impacts, based on both an extensive baseline data set (which has been collated and reviewed as detailed in Appendices A5a and A6c) and further targeted investigations.

Some of the key management plans are described above.

3.6.4.4.8 Supplementary flows

The Department considers the AEIS does not contain sufficient information regarding the implementation and effectiveness of supplementary flows to manage groundwater drawdown impacts on groundwater-dependent ecosystems (GDEs). As noted in comment 1, the Department has low confidence in the groundwater model predictions whilst noting there is a lack of site-specific data to inform the feasibility of supplementary flows.

In particular, the following information has not been provided:

- *the identification of GDEs that may require supplementary flows, their preferred source of water and the seasonal characteristics of groundwater*
- *an analysis of the nature of surface water-groundwater connectivity*
- *an analysis of water availability, potential sources of supplementary water, and suitability of water quality of potential sources*
- *an assessment of the potential impacts on the water quality of the alluvial aquifer due to recharge from the supplementary flows*
- *determination of the volumes and discharge rates of supplementary flows to maintain GDEs and*
- *preparation of an adequate monitoring program that identifies when supplementary flows were needed and evaluates their effectiveness.*

The AEIS notes that if this proposed management measure were not to be successful, there would be high risks of adverse impacts on GDEs. The Department notes that no alternate management measure/s has been identified or assessed by the proponent to manage groundwater impacts on GDEs.

Further, the Department considers that a commitment to develop and implement a Receiving Environmental Management Plan (REMP), without providing specific measures to manage impacts on GDEs, is not adequate.

CQC Response

A detailed response to this issue has been provided in the response to the Queensland DAF Comment 1 (Section 3.6.1.1). In summary, the additional studies, assessments and modelling

conducted (including detailed drilling transects, long term baseline datasets and revised numerical groundwater, water balance and streamflow modelling) has identified that supplementary flows are not required. Additional works have been conducted to identify GDEs and assess impacts, and a draft Receiving Environment Monitoring Program (Appendix A10f) has been developed, along with a draft GDEMMP (Appendix A10e).

3.6.4.4.9 Proposed monitoring framework

The Department considers the proposed monitoring framework is not adequate to identify and monitor impacts or trigger suitable management measures. The Department considers key deficiencies of the proposed monitoring framework include:

- *the baseline surface water quality data is inadequate, and there is no seasonal and inter-annual variability information*
- *no proposed surface water quality monitoring post-closure to monitor erosion of the proposed final landform (proposed to comprise sodic and highly erosive soils)*
- *no proposed long-term monitoring to detect potential saltwater intrusion*
- *the proposed long-term surface water quality monitoring is not adequate*
- *no proposed long-term monitoring of potential acid sulphate soils (PASS) downstream of the project site, including within and outside (i.e. in the intertidal zone) of the predicted zone of groundwater drawdown*
- *no proposed monitoring of supplementary flows to assess their effectiveness and success*
- *no TARPs (Trigger, Action, Response Plans) have been provided*
- *the proposed upstream locations of surface water monitoring sites are not appropriate because there is only one site for each creek and the data from the sites will be impacted by mine runoff*
- *the early warning capability of the monitoring network is inadequate*
- *the groundwater monitoring network is inadequate, and there are no compliance or reference bores to the north and/or north-east of the project site to target the Basement aquifer, and no reference bores to the east of the project site to target all aquifers and*
- *inconsistency in the long-term monitoring approach of post-mining impacts from the final landform.*

Further, the Department considers that a commitment to develop and implement a REMP, Rehabilitation Framework and ESCP to manage impacts on water resources, without the specific details, is not adequate.

CQC Response

- *the baseline surface water quality data is inadequate, and there is no seasonal and inter-annual variability information*

Surface water quality monitoring data has been collected in the Styx River catchment since 2008, at the locations shown in Figure 9-1 of Chapter 9 – Surface Water, and from the following sources:

- January 2008 to March 2012 – 21 discrete monitoring events by the FBA covering mostly storm events
- June 2011 to July 2012 – 12 approximately monthly events by CQC covering several storm events and otherwise mostly baseflow events and

- February 2017 to the present – 37 approximately monthly events by CQC up to 28 May 2020 (for the purposes of this assessment), predominantly 'no flow' events – that is, events with little to no discernible longitudinal flow along the creeks, due to the extended dry conditions.

Table 9-2 of Chapter 9 shows the number of events per site and the period of measurement. The overall program has excellent coverage of the main Project site and lease area, with locations upstream and downstream. Sites with >24 sampling events are located along both Tooloombah and Deep Creeks, the confluence of both creeks and at the Ogmore Bridge, representing both upstream, adjacent and downstream reaches of these creeks in relation to the Project. Reference sites on Montrose and Granite Creeks have a good number of events recorded, close to the QWQG recommended 18 rounds.

- *no proposed surface water quality monitoring post-closure to monitor erosion of the proposed final landform (proposed to comprise sodic and highly erosive soils)*

Surface water quality monitoring has been committed to as part of the rehabilitation management strategy in Chapter 11 - Rehabilitation and Decommissioning.

- *no proposed long-term monitoring to detect potential saltwater intrusion*

Long term monitoring for saltwater intrusion is not required as the freshwater-seawater interface has been shown to be beyond the influence of the Project (refer to the response to the Queensland DAF Comment 1, Section 3.6.1.1). Regardless, monitoring of groundwater wells will include salinity, and trigger values include consideration of salinity levels against existing baseline levels.

- *the proposed long-term surface water quality monitoring is not adequate*

A Receiving Environment Monitoring Program (REMP) has been prepared (Appendix A10f). The draft REMP describes the rationale and salient aspects of a monitoring program for the receiving environment surrounding the Project Site, including the location of monitoring sites, monitoring frequency and parameters. The REMP is designed to evaluate changes in the quality of the receiving environment, with a focus on surface water quality, sediment quality, aquatic ecology habitat quality, marine ecology habitat quality, macroinvertebrates and fish. Several control and impact sites have been established upstream of, adjacent to, and downstream of the Project.

- *no proposed long-term monitoring of potential acid sulphate soils (PASS) downstream of the project site, including within and outside (i.e. in the intertidal zone) of the predicted zone of groundwater drawdown*

Section 5.3.6 of Chapter 5 – Land provides a detailed assessment of the likelihood of acid sulfate soils (ASS), either actual (AASS) or potential (PASS) within the Project disturbance area and within the groundwater drawdown extent. Long-term monitoring of potential acid sulphate soils (PASS) downstream of the project site is not required as based on the existing risk mapping, topographic levels in the area, and both geological, geomorphological and soils investigation results, the assessment concluded that there is no evidence for ASS in the area, and that there is no justification for detailed ASS or PASS investigations (based on Dear et al. 2014).

- *no proposed monitoring of supplementary flows to assess their effectiveness and success*

Supplementary flows are no longer proposed. Table 10-84 of the previous SEIS v2 presented "available mitigation and management measures" to deal with the formerly anticipated reductions in surface water quantity as a result of the Project. As mentioned above in response to Comment 1 in Section 3.6.1.1 the effects of groundwater drawdown on Aquatic GDEs is expected to be relatively minor, and the Project will have a negligible impact on surface runoff volumes draining to

Tooloombah and Deep creeks. Hence, flow conditions in the Deep and Tooloombah Creeks are not expected to be significantly affected, hence supplementary flows are not required.

- *no TARPs (Trigger, Action, Response Plans) have been provided*

TARPS are included in the Project EMP in Appendix 12.

- *the proposed upstream locations of surface water monitoring sites are not appropriate because there is only one site for each creek and the data from the sites will be impacted by mine runoff*

The proposed sites detailed in the REMP (Appendix A10f) include upstream sites in both Deep and Tooloombah Creeks, none of which are affected by mine runoff:

- Tooloombah Creek has two upstream control sites - To4 (Tooloombah Creek) and Mam01 (Mamelon Creek), both of which are upstream of any mine influences from the Project. These discharge to To1, nominated as a potential impact site due to its location adjacent to the site, although it is also upstream of any likely inflows to Tooloombah Creek.
- Deep Creek has two upstream control sites - De1 (Deep Creek) and Ba1x (Barrack Creek), both of which are upstream of any mine influences from the Project. Site De2 is also upstream of any Project dam release points, though is affected by the southern catchment diversion drain, and these plus site De3 are upstream of the Dam 1 release point.

These are considered appropriate for the Project, given that an upstream unaffected site is included in each system, including upstream tributaries, and the first 'impact' site is not subject to site discharge flows.

- *the early warning capability of the monitoring network is inadequate*

The water management system described in the Draft Mine Site Water Management Plan in Appendix A5c, with the overall monitoring program summarised in Section 9.7.7 of Chapter 9 - Surface Water. The program includes monthly field monitoring of all site dams, quarterly monitoring of Dam 1 and monthly or when daily rainfall > 50mm monitoring of receiving waters, with weekly water level in Dam 1. Daily monitoring of any site releases is also required, including monitoring receiving waters during and/or in the days immediately following a mine affected water release.

This provides for a good capacity to understand the current water quality within site dams and the water level within the main Dam 1 storage, with good data collection for release events. As noted in earlier responses, there is not expected to be any impacts to downstream water quality as a result of any controlled or uncontrolled discharges from the Project (see Section 9.6.5 of Chapter 9 – Surface Water), and so these controls are considered to provide suitable early warning capability.

- *the groundwater monitoring network is inadequate, and there are no compliance or reference bores to the north and/or north-east of the project site to target the Basement aquifer, and no reference bores to the east of the project site to target all aquifers and*

CQC has collected groundwater samples at 21 bores over 30 monthly events, and at a further 30 bores drilled in 2018 over 8 monthly events. The bores cover the full spectrum of hydrostratigraphic units. As such, given the spread of the bores sampled, and the timeframe samples are spread over (2.5. years), the monitoring network is considered adequate, both spatially and temporally.

A new vibrating wire piezometer has been installed in the Back Creek Group to the north-east of the Project (WMP31, December 2019), with four depths from 50 mbgl to 170 mbgl. A standpipe was installed in the same location in April 2020 (WMP31B), screened in the same formation from 33 – 42 mbgl. Another bore – WMP32 – was installed in April 2020 screened at 57 – 63 mbgl to the east of the Project targeting the Styx Coal Measures. In addition, the WMP21/WMP21D nested site

(targeting Quaternary Alluvium at 7 – 9.9 mbgl and Styx Coal Measures between 14 – 20 mbgl) was added to with WMP21B, targeting the deeper Styx Coal Measures at 86 – 92 mbgl.

Monitoring bores to the east of the Project are problematic due to the faulted geology and presence of shallow Permian Back Creek Group at the surface, and so the above (along with the other existing sites, such as WMP05 (Qa), WMP11/WMP11D (Kx), BH16/BH20 (Qa), WMP13 (Kx) and WMP29A-E (Qa, Qpa, Kx, Pb), all to the north, and WMP18/WMP18D (Qa, Kx) and WMP10/WMP10D (Kx) all east) are considered a suitable number of compliance / reference bores covering all relevant hydrostratigraphic units.

- *inconsistency in the long-term monitoring approach of post-mining impacts from the final landform.*

Monitoring is committed to as part of the rehabilitation strategy in Chapter 11 - Rehabilitation and Decommissioning, including adherence to management and monitoring plans including the Progressive Rehabilitation and Closure Plan (PRCP) (to be developed post-approval), Erosion and Sediment Control Plan (draft in Appendix A15a), Receiving Environment Monitoring Plan (draft in Appendix A10f) and Water Management Plan (draft in Appendix A5c). The post-closure monitoring will be stipulated in the PRCP, which will be finalised and require approval prior to the commencement of mining operations, based on the completion criteria which requires, among other things, monitoring of post-mining period surface and groundwater. The other plans outlined above include requirements for monitoring of site discharges and receiving waters, which will continue until superseded by the PRCP following closure of the mine.

Further, the Department considers that a commitment to develop and implement a REMP, Rehabilitation Framework and ESCP to manage impacts on water resources, without the specific details, is not adequate.

A draft Receiving Environment Monitoring Program (Appendix A10f) has been developed.

3.6.4.5 Comment 4

TOR Category or EIS Chapter		Submitters Reference to EIS Section (if provided)	Biodiversity Offsets – Mamelon Property Section in AEIS: 16.19
Submitters Reference (if provided)	Comment 4: Biodiversity Offsets - Mamelon Property		

Details of the Submission

Not adequately addressed - submission 20

The Department considers the proposed offsets on the Mamelon Property may not meet the requirements of the EPBC Act Offsets Policy (2012) for the following reasons:

- the potential for groundwater drawdown impacts on identified Koala and Greater Glider habitat near Deep Creek (see comment 1 above) has not been considered
- conservation gain of the proposed offsets are not new or additional as the risk of loss for the unaffected habitat is low (i.e. the habitat would not be lost in the future as a result of the proposed mining development) and
- proposed offset areas do not provide connectivity with habitat in the Southern Brigalow region.

Suggested Solutions, Recommendations and Conditions

Based on the information in the AEIS, the Department considers the proponent has not adequately responded to submission 20.

Proponent Response

3.6.4.5.1 Not adequately addressed - submission 20

CQC note that submission 20 regarding the EIS said:

Suitability of potential habitat on the broader Mamelon property to be used as offsets for residual impacts to MNES.

Recommendation:

Where potential offsets have been identified, show that potential offsets have been considered in accordance with the EPBC Act Environmental Offsets Policy (2012) and the offsets calculator.

The offsets calculator can be found on the Department's website at www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy.

The Department notes that the proposed offsets on the Mamelon property may not meet the requirements of the EPBC Act Offset Policy:

- *the potential for groundwater drawdown impacts on identified Koala and Greater Glider habitat near Deep Creek, south of the Waste Dump Area, as illustrated in Figure 16-18 (p16-140);*
- *the conservation gain of the proposed offsets are not new or additional as the risk of loss for the unaffected habitat is low (i.e. the habitat would not be lost in the future as a result of the proposed mining development); and*
- *the proposed offset areas do not seem to provide connectivity with contiguous habitat in the Southern Brigalow region (Figure 16-23, p16-207).*

CQC Response

3.6.4.5.2 *The Department notes that the proposed offsets on the Mamelon property may not meet the requirements of the EPBC Act Offset Policy*

CQC is committed to providing biodiversity offsets to compensate for unavoidable direct and indirect significant residual impacts on MNES under the EPBC Act Environmental Offsets Policy (DSEWPC 2012).

To demonstrate that the Project offsets satisfy the requirements of the EPBC Act Offset Policy CQC has prepared a Biodiversity Offset Strategy which includes information, data and analysis as required in accordance with the offset policy. The Biodiversity Offset Strategy is provided in Appendix 11a. Two offset properties are proposed for the Project as described in the Biodiversity Offset Strategy – Mamelon and [redacted] The majority of Project offsets for MNES will be located on Mamelon, however, the offset for ornamental snake will be located on the [redacted] property, as there is no suitable habitat for ornamental snake located within the Mamelon offset area.

The Biodiversity Offset Strategy provides a detailed account of how the Project's anticipated offset requirements will be acquitted and CQC's approach to delivering these offsets, and demonstrates how the offsets meet the requirements of the EPBC Act Offset Policy. In regard to MNES, and in accordance with the requirements of the EPBC Act Offset Policy, the Biodiversity Offset Strategy includes:

- a summary of the Project's avoidance and mitigation measures (See Section 4)
- the Project's direct and indirect unavoidable significant residual impacts on MNES requiring offsets (see Section 5)
- details of the Project's offsets to acquit these requirements including:
  - an overview of the properties, landholders, offset arrangement and acquisition status
  - description of the ecological surveys undertaken, environmental values present and the offset areas proposed (see Section 6)
  - inputs, justifications and results of the EPBC Act offsets assessment guides (see Appendix D)
  - how the proposed offsets as a package meet the requirements of the EPBC Act Environmental Offsets Policy (see Table 15)
- a plan for offset delivery, implementation and review including:
  - finalisation of agreements with landholders for the offset areas (see Section 7.1)
  - finalisation and approval of the Offset Area Management Plans (OAMPs), as well as summary of proposed management and monitoring actions to be implemented (see Section 7.4)
  - process for legal security of the offset areas (see Section 7.5)
  - process for reviewing and reporting on actual significant residual impacts offset, and updating the Biodiversity Offset Strategy accordingly if any additional offsets are required (see Section 7.6) and
- the Project's draft OAMPs (see Appendix G of the Biodiversity Offset Strategy or Appendix 11c and 11d of SEIS v3).

Table 15 of the Biodiversity Offset Strategy, which demonstrates how the proposed offset package for the Project meets the key overarching requirements of the EPBC Act Offsets Policy is replicated below in Table 3-15.

Table 3-15: EPBC Act Environmental Offsets Policy requirements and the Project's compliance

EPBC Act Environmental Offsets Policy requirement	Offset Package for the Project
Suitable offsets must deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	In accordance with the EPBC Act Environmental Offsets Policy and offsets assessment guide, the Mamelon and [redacted] offset areas will fully acquit the anticipated MNES offset requirements for greater glider, koala, squatter pigeon and ornamental snake. The Mamelon and [redacted] offset areas will be managed to improve the condition and viability of the threatened species habitat. The Mamelon and [redacted] OAMPs set out specific management objectives with interim performance targets and completion criteria. Management actions are outlined with accompanying adaptive management triggers and corrective actions in the event that monitoring identifies interim performance targets are not attained or completion criteria are not attained and/or maintained. The Mamelon and [redacted] offset areas will be managed and monitored from approval of the OAMPs for a minimum of 20 years. It is anticipated that the completion criteria will be achieved within a 20-year period.

EPBC Act Environmental Offsets Policy requirement	Offset Package for the Project
Suitable offsets must be built around direct offsets but may include other compensatory measures	100% of the Project's anticipated MNES offset requirements will be acquit through the delivery of direct land-based offsets on Mamelon and [redacted] These offset areas have been determined to be suitable in accordance with the EPBC Act Environmental Offsets Policy and offsets assessment guide.
Suitable offsets must be in proportion to the level of statutory protection that applies to the protected matter	The threatened status of the impacted protected matters are taken into account by the offsets assessment guide in calculating the area of the offsets to be provided.
Suitable offsets must be of a size and scale proportionate to the residual impacts on the protected matter	The size of the Mamelon and [redacted] offset areas to be secured have been calculated in accordance with the offsets assessment guide. The inputs and justifications are based on the results of detailed field assessments.
Suitable offsets must effectively account for and manage the risks of the offset not succeeding	The Mamelon and [redacted] offset areas to be secured have been calculated in accordance with the offsets assessment guide. The inputs, justifications and results are set out in Appendix D of the Biodiversity Offset Strategy.
Suitable offsets must be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs	The proposed Mamelon and [redacted] offset areas are zoned rural under the Livingstone Shire Council and Isaac Regional Council, respectively. The current primary land use on both the offset properties is cattle grazing. The proposed offsets are subject to potential threats, including spread of weeds such as Parthenium (*Parthenium hysterophorus*) and exotic pasture grasses, pest animals, inappropriate fire regimes and potential future development.
Suitable offsets must be efficient, effective, timely, transparent, scientifically robust and reasonable	The process used to identify, secure and establish offsets for the Project is consistent with the key requirements of the EPBC Act Environmental Offsets Policy. The offset areas have been identified and deemed suitable using an evidence-based and scientifically robust approach. The Mamelon and [redacted] OAMPs supports the efficient, effective, timely, transparent and scientifically robust approach to providing offsets.
Suitable offsets must have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.	The Mamelon and [redacted] OAMPs outline a governance framework and delivery pathway to legally secure the offset areas on the title of each of the properties, which will be monitored, and audited/enforced.

3.6.4.5.3 The potential for groundwater drawdown impacts on identified Koala and Greater Glider habitat near Deep Creek (see comment 1 above) has not been considered

CQC Response

Potential groundwater drawdown impacts on koala and greater glider habitat are assessed in Chapter 16 – MNES, Section 16.10.3.1.

Potential for groundwater drawdown impacts in relation to koala and greater glider habitat have been considered in terms of both:

- the quantum of impacts on habitat for these species as a result of groundwater drawdown and
- where offsets for these species are proposed to be located on Mamelon, offset areas have been located outside of the area of potential groundwater drawdown impact.

1. Groundwater drawdown impacts on habitat for koala and greater glider

Groundwater drawdown impacts on vegetation that provides habitat for these species have been included in the quantum of impacts assessed for these species (as summarised below).

Greater Glider

Predicted declines in vegetation characteristics and condition as a result of groundwater drawdown along sections of Deep Creek has the potential to impact habitat for greater gliders. Potential impacts include:

- Reduction in the availability of leaf forage, including eucalypt shoot growth, affecting not only nutrition but also water balance, since the species obtain a significant proportion (upwards of 60%) of their daily water needs from the foliage of feed trees.
- Reduction in leaf (foliar) water content affecting the ability of greater glider to maintain water balance, particularly under hot / dry conditions or in drought affected areas where free water is scarce.
- Increased physiological stress due to reduced availability of food / water, and shelter.

Based on a worst case scenario impact assessment, groundwater drawdown is predicted to impact approximately 165 ha of riparian vegetation which is known or potential habitat for the greater glider (Table 3-16). This impact represents approximately 1.7 % of the potentially equivalent habitat within 10 km of the Project Site. As previously described, decline in vegetation condition is expected to occur gradually and will not commence until at least 10 years after Project commencement. In accordance with the MNES Significant Impact Guidelines 1.1 (DE 2013) impacts of groundwater drawdown on habitat for greater glider along Deep Creek is a significant impact (see Section 16.10.3.1.1 for full details of the assessment).

Table 3-16: Greater glider habitat loss

Habitat Type	Vegetation Clearing (ha)	Groundwater Drawdown (ha)	Total (ha)
Remnant			
Known	115.74	40.82	156.56
Potential	0.00	124.39	124.39
Total	115.74	165.21	280.95
Non-remnant			
Potential	0.10	0.00	0.10
Total	0.10	0.00	0.10

Koala

Predicted declines in vegetation characteristics and condition as a result of groundwater drawdown has the potential to impact habitat for koala. Potential impacts include:

- Loss of shelter / shade due to canopy thinning and / or mortality of shelter trees.
- Reduction in the availability of leaf forage, including eucalypt shoot growth, affecting not only nutrition but also water balance, since koala obtain a significant proportion (upwards of 60%) of their daily water needs from the foliage of feed trees.
- Reduction in leaf (foliar) water content affecting the ability of the species to maintain water balance, particularly under hot / dry conditions or in drought affected areas.

- Increased physiological stress due to reduced availability of food / water and shelter may potentially increase the susceptibility of koalas to diseases such as Chlamydia, which can lead to reduced fertility, increased blindness and increased mortality.

Based on a worst case scenario impact assessment, groundwater drawdown is predicted to impact approximately 165 ha of riparian vegetation which is known or potential habitat for the koala at Deep Creek (Table 3-17). This impact represents approximately 1.9 % of the potentially equivalent habitat within 10 km of the Project Site. As previously described, decline in vegetation condition is expected to occur gradually and will not commence until at least 10 years after Project commencement. In accordance with the MNES Significant Impact Guidelines 1.1 (DE 2013) impacts of groundwater drawdown on habitat for koala along Deep Creek is a significant impact (see Section 16.10.3.1.2 for full details of the assessment).

Table 3-17: Koala habitat loss

Habitat Type	Vegetation Clearing (ha)	Groundwater Drawdown (ha)	Total (ha)
Remnant			
Known	138.94	40.88	179.82
Potential Dispersal	2.40	124.34	126.74
Total	141.34	165.22	306.56
Non-remnant			
Known or Potential	18.06	0.00	18.06
Total	18.06	0.00	18.06

2. Groundwater drawdown impacts on Mamelon offset areas

As described in Section 16.10.1.2 of Chapter 16 – MNES, 165.23 ha of riparian vegetation, comprising RE 11.3.25, RE 11.3.27, RE 11.3.35, and RE 11.3.4 is predicted to the affected by groundwater drawdown. It should be noted that this prediction is based on conservative assumptions (see Section 16.6.7 of Chapter 14) and a worst-case scenario impact assessment and so it is possible that the area to be affected may be substantially less than 165.23 ha.

As shown in Figure 3-13, the 165.23 ha of vegetation that may be affected by groundwater drawdown has been excluded from the Mamelon offset areas.

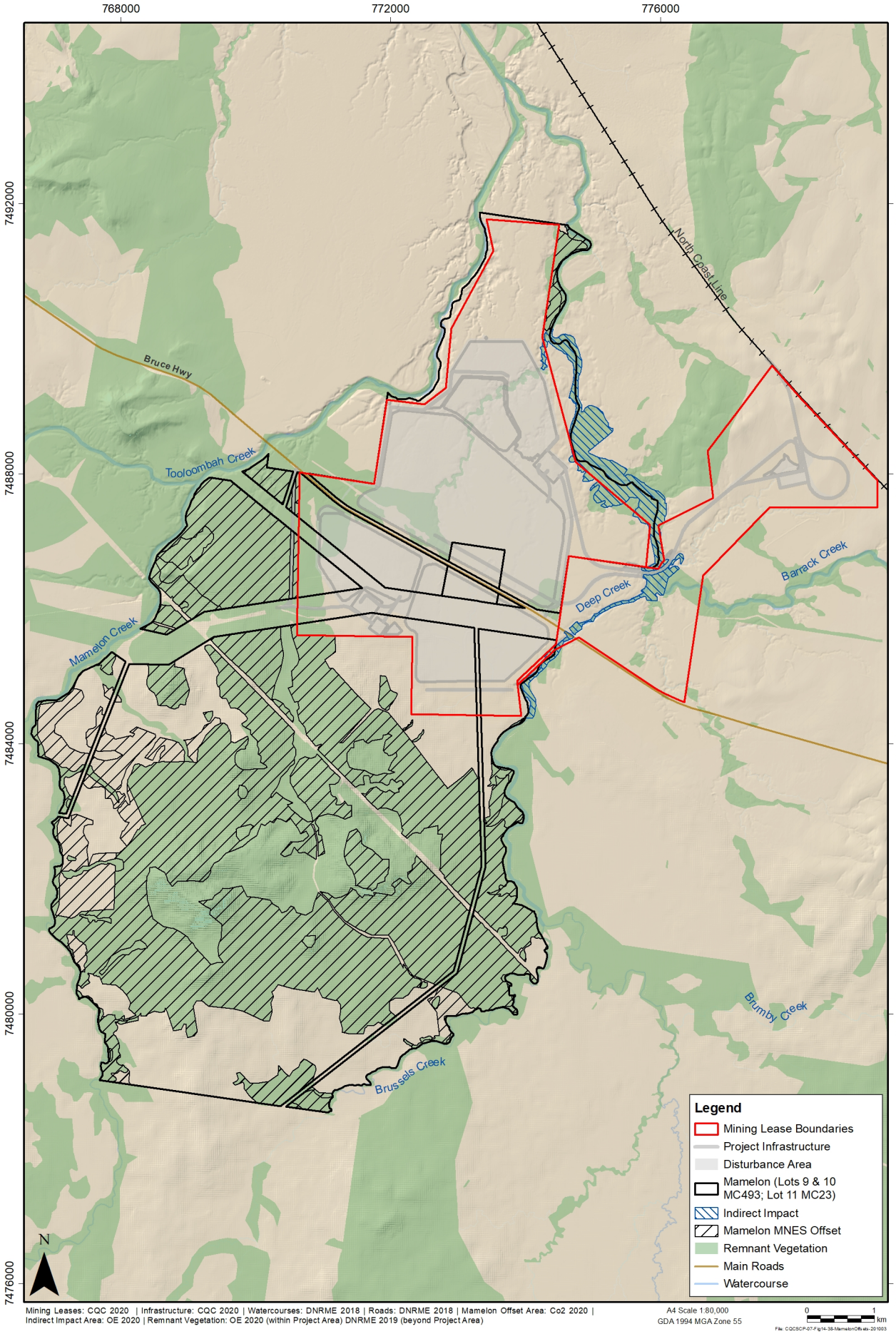


Figure 3-13: Vegetation potentially impacted by groundwater drawdown and proposed Mamelon offset areas

3.6.4.5.4 Conservation gain of the proposed offsets are not new or additional as the risk of loss for the unaffected habitat is low (i.e. the habitat would not be lost in the future as a result of the proposed mining development)

CQC Response

Since the submission of SEIS v2, CQC has prepared a Biodiversity Offset Strategy for the Project and the proposed offset areas for MNES have been revised (see Appendix 11a). Two offset properties are proposed for the Project as described in the Biodiversity Offset Strategy – Mamelon and [redacted] The majority of Project offsets for MNES will be located on Mamelon, however, the offset for ornamental snake will be located on the [redacted] property, as there is no suitable habitat for ornamental snake located within the Ma[redacted]on offset area.

The suitability of these offset areas have been assessed in accordance with the requirements of the EPBC Act Environmental Offsets Policy (DSEWPC 2012) and the associated offsets assessment guide. The outcomes of this assessment are presented in detail in the Biodiversity Offset Strategy. The offsets assessment guide considers risk of loss and offset quality, both now and in the future. As such, consideration of risk of loss and conservation outcomes (in terms of current and future offset quality) have been addressed as per the requirements of the EPBC Act offsets assessment guides.

Appendix D of the Biodiversity Offset Strategy presents the results of the offsets assessment guides, inputs and supporting justification for MNES proposed to be offset on Mamelon and [redacted] For the following inputs, the justifications provided for each MNES are based on impact habitat quality scoring method outlined in Appendix B of the Biodiversity Offset Strategy, identified risks and threats to each MNES and its habitat considering the current management regime on Mamelon and [redacted]:

- Quality of impact area
- Quality of offset area
- Future quality without offset management
- Future quality with offset management
- Risk of loss without offset and
- Time until ecological benefit (years).

For the inputs listed below, the relevant scores were assessed at an offset area level or are relevant for each MNES:

- Confidence in result – future quality
- Risk of loss with offset
- Confidence in result – risk of loss and
- Time over which loss is averted (years).

Table D 1 in the Biodiversity Offset Strategy summarises the offsets assessment guide inputs for each MNES. This table is replicated below in Table 3-18.

Table D 2, Table D 3, Table D 4 and Table D 5 in the Biodiversity Offset Strategy present the inputs and justifications for each MNES. These tables are replicated below in Table 3-19 (greater glider), Table 3-20 (koala), Table 3-21 (squatter pigeon), and Table 3-22 (ornamental snake).

Both the offset areas on Mamelon and [redacted] are subject to a number of threatening processes including the degradation of habitat from vegetation clearing, livestock overgrazing, feral animals and weed invasion.

The OAMPs for Mamelon and [redacted] will guide the ongoing management and monitoring of the MNES and MSES offset areas (see Appendix 11c and 11d). Following regulator endorsement of the offsets assessment guides, and further liaison with the [redacted] landholders, the OAMPs will be finalised and submitted to the Commonwealth for approval. The approved OAMPs will be implemented by CQC.

Management actions in the OAMPs are based on detailed site assessments and the key threats and recommended priority actions for each MNES, as listed in recovery plans, threat abatement plans and conservation advices. Property and species-specific details for management are defined in detail in the respective OAMPs for Mamelon and [redacted], with corresponding actions also informed by general guidance such as the regional and local priority actions under each conservation advice.

The offset areas will be managed in accordance with the OAMPs in order to minimise the risk of identified threats to the MNES and MSES occurring and to improve habitat for offset matters across the offset area. The management of the offset areas in accordance with the OAMPs will result in an overall conservation gain for the protected species.

Monitoring measures identified in the Mamelon and [redacted] OAMPs are in accordance with recognised survey guidelines, other relevant documents and best practice. Monitoring in both offset areas will include habitat quality assessments, photo monitoring, weed surveys, pest animal surveys, targeted fauna surveys, biomass monitoring, ground cover and erosion monitoring and general inspections of fencing, access tracks and firebreaks. Site and species-specific monitoring measures have been developed as part of the individual OAMPs.

The Mamelon and [redacted] offset areas are proposed to be protected by a Voluntary Declaration under section 19E and 19F of the *Vegetation Management Act 1999* (VM Act) and will be declared as an area of high nature conservation value. The Voluntary Declaration will be registered on the property's title and will be binding on current and future landowners.

Table 3-18: Summary of offsets assessment guide inputs for each MNES

Inputs		Greater glider (Mamelon)	Koala (Mamelon)	Squatter pigeon (Mamelon)	Ornamental snake [redacted]
Impact	Area (ha)	281.0	324.6	306.6	18.8
	Quality	7	7	7	5
Offset start hectares (ha)		2,428.4	2,803.4	2,667.1	121.1
Offset quality	Start quality	7	7	7	7
	Future quality without offset	7	7	7	7
	Future quality with offset	8	8	8	8
	Confidence in result (%)	80%	80%	80%	80%
Risk of loss	Without offset	0.69%	0.69%	0.69%	0.42%
	With offset	0%	0%	0%	0%
	Confidence in result (%)	90%	90%	90%	90%
Risk related time horizon/time over which loss is averted (max. 20 years)		20	20	20	20
Time until ecological benefit		20	20	20	20
% impact offset		100.15%	100.06%	100.81%	102.37%

Table 3-19: Greater glider offsets assessment guide input justifications (Mamelon).

Input	Score	Justification
Quality of impact area	7	Greater glider habitat within the immediate vicinity of the project area was assessed and defined by Austecology (2020a and 2020b), whom considered 8 REs as supporting suitable habitat for greater gliders. These REs included either tree species in which gliders were assumed to be browsing during site surveys, and/or tree species regarded by other studies as known feed tree species in Queensland, e.g. *Eucalyptus tereticornis, E. tessellaris, E. crebra, E. moluccana, Angophora floribunda, Corymbia citriodora,* and *C. intermedia* (Kehl and Boorsboom 1984, Smith et al. 2007, L. Agnew pers obs.). Clearing associated with direct and indirect impacts (water drawdown) of the project on greater glider habitat comprises ~281 ha of areas supporting RE 11.3.25, RE 11.4.2, RE 11.3.4, RE 11.3.35, RE 11.5.8 and RE 11.3.27. This comprises ~157 ha of known remnant habitat and 124 ha of potential remnant habitat (Austecology 2020a). The quality of greater glider habitat within the project impact area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality, identifying an impact habitat quality score of 7.
Quality of offset area	7	Greater glider habitat within the offset area comprises 2,428 ha of ground-truthed remnant RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25. This habitat is located throughout Mamelon, including lowland areas in the vicinity of Tooloombah Creek, Mamelon Creek and Deep Creek as well as upland areas supporting eucalypt woodland. Each of these REs are considered suitable habitat; being consistent with the habitat assessment results undertaken by Austecology (2020a and 2020b) in the vicinity of the offset area. Targeted spotlighting surveys conducted in October and November 2019 confirmed the presence of greater glider in the offset area, including foraging and denning in a variety of trees including *Eucalyptus crebra, E. platyphylla* and *E. populnea*. At least 22 greater glider were observed in November 2019 along and adjacent Deep Creek in the east of Mamelon, with additional individuals observed along Barrack Creek in Strathmuir to the east of Mamelon. A survey of fauna habitat features identified numerous large, hollow-bearing trees throughout all of the offset area REs, including a diversity of eucalypt foraging and denning trees species known or observed as being used by greater glider in the area (e.g. *E. camaldulensis*, *E. tereticornis, E. crebra, E. populnea, E. platyphylla* and dead standing stags). The quality of greater glider habitat within the offset area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality. The current land use across much of Mamelon is cattle grazing, with grazing evident in all areas of greater glider habitat. Grazing in these areas has resulted in reduced recruitment of habitat trees, as well as evidence of weeds and exotic pasture grasses, particularly *Parthenium*, prickly pear (*Opuntia spp.*), lantana (*Lantana camara*) and rubber vine (*Cryptostegia grandiflora*), with the greatest density of weeds (particularly *Megathyrsus maximus*) within Tooloombah Creek, Mamelon Creek and Deep Creek corridors corresponding to RE 11.3.25. The incursion of weeds and exotic pasture has the potential to increase the frequency of high intensity fires as they increase fuel loads causing habitat tree recruitment loss, habitat loss, and fragmentation of habitat.
Future quality without offset management	7	Should an offset not be secured, the quality of habitat for the greater glider within the next 20 years is expected to be maintained at a score of 7 based on the following: • Ongoing commercial livestock grazing across the property, with livestock favouring riparian and adjacent areas associated with Tooloombah Creek, Mamelon Creek and Deep Creek and surrounding remnant and regrowth areas resulting in: - Limited recruitment of preferred roosting and shelter tree species for the greater glider - Continued presence of weeds and exotic pasture grasses, particularly *Parthenium*, prickly pear (*Opuntia spp.*), lantana (*Lantana camara*), rubber vine (*Cryptostegia grandiflora*) and *Megathyrsus maximus* within the creek corridors corresponding to RE 11.3.25. - Limited pest animal control, other than the landholder's general biosecurity obligation under the Biosecurity Act 2014 (Qld), increasing the risk of pest animal predation and decreasing the viability of the offset area to support greater glider populations - Potential for clearing of unregulated vegetation (associated particularly with regrowth RE 11.4.2) within the offset area by the current or future landholder. While regrowth RE 11.4.2 is not considered offset habitat, clearing of this or other unregulated vegetation within the offset area will contribute to further fragmenting habitat connectivity through the landscape.
Future quality with offset management	8	An offset area for greater glider on Mamelon will be secured and managed, to improve the quality of vegetation communities and accompanying habitat features contributing to greater glider habitat. The quality of greater glider habitat will be improved through an increase in site condition, site context and/or species stocking rate to achieve a future quality of 8. The following outlines increases in relevant attributes that in part or whole will contribute to the completion criteria being achieved (a future quality score of 8) over 20 years of active management under the OAMP: • Site condition – the following scores for each ecological attribute will be achieved through the implementation of specific management actions under the OAMP: - Native shrub species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Native grass species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Native forb species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Tree canopy height – increase the score across all monitoring sites to a 5 representing 70% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Shrub canopy cover – increase the score across all monitoring sites to a 5 representing between 50% and 200% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Native perennial grass cover – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Large trees – increase the score across all monitoring sites to a 10, representing between 50% to 100% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Non-native plant cover – increase the score across all monitoring sites to a 10 representing <5% non-native plant cover at each site. • Site context - Average site context score for each RE is maintained or increased compared to the start quality score: - RE 11.10.7 – ≥ 7.03 - RE 11.11.15 – ≥ 7.38 - RE 11.4.2 – ≥ 8.50 - RE 11.5.8 – ≥ 7.60

Input	Score	Justification
		- RE 11.3.25 – ≥ 8.53 • Species habitat index - Increase the threats to species score to a 15 through the implementation of the OAMP specifically implementation of successful pest animal control targeting wild dogs, cats and foxes, active fire management, security through a legally binding mechanism and active management of the area for conservation purposes. The OAMP will be implemented, in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for greater glider, including specific management actions aimed at reducing the impact of threatening processes and improving the quality of greater glider habitat within the offset area, including: • Pest animal control – control measures will be implemented focussing on control of wild dogs, feral cats and foxes within the offset area reducing the threat of predation on greater glider. • Livestock management – livestock will be excluded from the offset area except during strategic grazing events to control fuel loads and exotic pasture grasses. Periods of grazing will be followed by an extended period of rest and stocking rates will depend on seasonal conditions and pasture growth. • Weed control – weed hygiene restrictions and weed control activities will be undertaken within the offset area in order to reduce the threat of invasive weeds species (including exotic pasture grasses) to control fuel loads and to promote recruitment of foraging and shelter trees. • Fire management – fire management including establishment of fire breaks, control of fuel loads and implementation of low-intensity, controlled burns at appropriate intervals and times of year will be undertaken within the offset area. This will aim to reduce the risk of high intensity fires within the offset and assist with natural regeneration of vegetation communities, including foraging and shelter trees.
Confidence in result – future quality	80%	An OAMP will be developed in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for the species, and negotiations with the landholder. The OAMP will detail specific management objectives and outcomes aimed at improving the quality of species habitat. Ongoing monitoring of the offset area will also be undertaken to regularly assess the progress of the offset and ensure the OAMP achieves its required outcomes. The OAMP will support an efficient, effective, timely, transparent, scientifically robust and reasonable approach to managing and monitoring the offset area.
Risk of loss without offset	0.69%	The clearing of remnant vegetation in Queensland is regulated by the VM Act and the *Planning Act 2016* and associated policies and codes. This framework identifies vegetation as one of four categories, varying in their degree of restriction on permissible clearing. Under the VM Act, an application must be made to the Queensland Government to clear remnant vegetation (Category B) unless an exemption applies. The VM Act prevents broad-scale clearing of remnant vegetation for agriculture or other development activities; however, clearing of some remnant vegetation for resource development purposes (e.g. mining) is allowed. The VM Act allows clearing of category X areas without requiring landholders to obtain approval. Areas mapped as category X are not subject to vegetation clearing codes and therefore have the potential to be cleared by the current or future landholders at any time. Pastoralists are motivated to clear vegetation for a variety of reasons; however, historically a combination of favourable conditions and higher commodity prices have coincided with increased rates of clearing (Evans, 2016). Market conditions over the coming years look to continue to put pressure on pastoralists to increase production which inevitably leads to higher rates of clearing (M. Taylor pers comm). This is supported by clearing rates for regrowth vegetation increasing every year since 2012 (Steffen and Dean, 2018). Historical clearing has disproportionately impacted vegetation on the most fertile soil, such as eucalypt woodlands on alluvial flats and Brigalow vegetation on clay plains. Expert estimates of the likelihood of clearing regrowth of alluvial ecosystems are as high as 90% (C. Hempel pers comm). The previous landholder previously cleared areas of unregulated Category X vegetation across the property. Much of the regrowth areas of RE 11.4.2 across the property were cleared in 2008, with retention of these regrowth areas representing important habitat facilitating dispersal between remnant vegetation areas in upslope areas and fringing riparian habitats; both known to support greater glider populations on Mamelon. Notwithstanding the property-specific decisions influencing any landholder's decision to clear, the risk that areas will be cleared resulting in the complete loss of habitat for greater glider within the next 20 years, is considered to be 0.69%. This percentage reflects the average annual background rate of loss (2005 – 2014) within the Rockhampton Local Government Area as outlined in the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document prepared by Maseyk et al. (2017).
Risk of loss with offset	0%	The offset area will be secured through declaration as an area of high nature conservation value under section 19F of the VM Act.
Confidence in result – risk of loss	90%	The legally binding mechanism will be registered on the land title and bind all current and future land owners to ensure that the offset is protected.
Time over which loss is averted (years)	20	The offset area will be protected by a legally binding mechanism which will remain in effect as required by the applicable State and Commonwealth legislative requirements, therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.
Time until ecological benefit (years)	20	The implementation of site-specific land management actions through the development and application of an OAMP is expected to increase the quality of the offset area by improving vegetation condition and reducing potential threats to greater glider habitat. An ecological benefit is expected to be realised in 20 years.

Table 3-20: Koala offsets assessment guide input justifications (Mamelon)

Input	Score	Justification
Quality of impact area	7	Koala habitat within the immediate vicinity of the project area was assessed and defined by Austecology (2020a and 2020b), whom considered 8 REs as supporting suitable habitat for koalas. These REs included regionally known koala food tree species, e.g. *Eucalyptus tereticornis*, *E. camaldulensis, E. platyphylla, E. crebra, E. exserta*, *Corymbia clarksoniana* and *C. intermedia* (Ellis et al. 2018, L. Agnew pers obs.). Furthermore, Melzer and Tucker (2011) ranked three RE, present in the immediate vicinity of the project, (RE 11.3.25, RE 11.5.8a, and RE 11.11.15a) within the moderate to high rankings for predicted likelihood of koala occurrence for their St Lawrence study area, to the north of the project area (Austecology 2020a). Koalas have been recorded within the project area during surveys in 2017 and 2018 by CDM Smith and by Austecology in 2019 (Austecology 2020a and 2020b). Clearing associated with direct and indirect impacts (groundwater drawdown) of the project on koala habitat comprises ~325 ha of areas supporting ground-truthed RE 11.3.25, RE 11.4.2 (remnant and regrowth(non-remnant)), RE 11.3.4,, RE 11.3.35, RE 11.5.8, RE 11.11.1 (regrowth) and RE 11.3.27. This comprises ~ 180 ha of known remnant habitat, ~127 ha of potential remnant dispersal habitat and 18 ha of known or potential non-remnant habitat* (Austecology 2020a). The quality of koala habitat within the project impact area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality, identifying an impact habitat quality score of 7.
Quality of offset area	7	Koala habitat within the offset area comprises ~2,803.4 of ground-truthed remnant RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35, RE 11.3.4, along with regrowth (non-remnant) RE 11.4.2 and regrowth (non-remnant) RE 11.11.15. The offset area comprises suitable foraging and breeding habitat for koala and is located throughout Mamelon, part of which is along and adjacent to Tooloombah Creek, Mamelon Creek and Deep Creek. Each of these REs are considered suitable habitat; being consistent with the habitat assessment results undertaken by Austecology (2020a and 2020b) in the vicinity of the offset area. These RE are considered appropriate habitat for koala, represented by a mix of *Eucalyptus tereticornis* woodland fringing Tooloombah, Mamelon and Deep Creek (RE 11.3.25) and adjacent *Eucalyptus populnea* and/or *E. platyphylla* grassy woodland on alluvial soils (RE 11.3.35) or clay plains (remnant and regrowth RE 11.4.2) and *Eucalyptus crebra* dominated woodland on remnant sand plain (RE 11.5.8) and old metamorphic sedimentary surfaces (RE 11.11.1, as well as remnant and regrowth RE 11.11.15). Areas of koala habitat offsets support known koala food trees, including *Eucalyptus crebra, E. tereticornis*, *E. populnea, E. exserta* and *C. citriodora*. Targeted surveys conducted in October and November 2019 confirmed the presence of no fewer 18 koalas within the offset area; including one observed feeding within a *E. exserta* on the boundary between RE 11.11.1 and RE 11.5.8 in the north-west of Mamelon, others sheltering in *E. crebra* within an area of regrowth RE 11.4.2, with numerous records along alluvial watercourses on Mamelon (RE 11.3.25). Additional evidence of their presence was confirmed throughout Mamelon in the form of characteristic scats and scratches. The quality of koala habitat within the offset area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality. The current land use across much of Mamelon is cattle grazing, with grazing evident in all areas of koala habitat, particularly regrowth areas of RE 11.4.2 and RE 11.11.15. Grazing in these areas has resulted in reduced recruitment of habitat trees, as well as evidence of weeds and exotic pasture grasses, particularly *Parthenium*, prickly pear (*Opuntia spp.*) and rubber vine (*Cryptostegia grandiflora*), with the greatest density of weeds (particularly *Lantana camara* and *Megathyrsus maximus*) within Tooloombah Creek, Mamelon Creek and Deep Creek corridors corresponding to RE 11.3.25. The incursion of weeds and exotic pasture has the potential to increase the frequency of high intensity fires as they increase fuel loads causing habitat tree recruitment loss, habitat loss, and fragmentation of habitat. Pest animal species have been observed in the offset area, including wild dogs; a known predator of koalas.
Future quality without offset management	7	Should an offset not be secured, the quality of habitat for the koala within the next 20 years is expected to be maintained at a score of 7 based on the following: • Ongoing commercial livestock grazing across the property, with livestock favouring riparian areas along Tooloomah and Mamelon Creek and surrounding remnant and regrowth areas resulting in: - Limited recruitment of preferred habitat tree species for the koala - Continued presence of weeds and exotic pasture grasses, particularly *Parthenium*, prickly pear (*Opuntia spp.*), lantana (*Lantana camara*), rubber vine (*Cryptostegia grandiflora*) and *Megathyrsus maximus* within the creek corridors corresponding to RE 11.3.25. - Limited pest animal control for wild dogs (confirmed in the offset area), other than the landholder's general biosecurity obligation under the Biosecurity Act 2014 (Qld), maintaining the viability of the offset area to support koala populations. - Potential for clearing of unregulated vegetation within the offset area by the current or future landholder, particularly regrowth areas of RE 11.4.2 corresponding to Category X areas under the Vegetation Management Act 1999
Future quality with offset management	8	An offset area for koala on Mamelon will be secured and managed, to improve the quality of vegetation communities and accompanying habitat features contributing to koala habitat. The quality of koala habitat will be improved through an increase in site condition, site context and/or species stocking rate to achieve a future quality of 8. The following outlines increases in relevant attributes that in part or whole will contribute to the completion criteria being achieved (a future quality score of 8) over 20 years of active management under the OAMP: • Site condition – the following scores for each ecological attribute will be achieved through the implementation of specific management actions under the OAMP: - Native shrub species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Native grass species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Native forb species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Tree canopy height – increase the score across all monitoring sites to a 5 representing 70% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Shrub canopy cover – increase the score across all monitoring sites to a 5 representing between 50% and 200% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4

Input	Score	Justification
		- Native perennial grass cover – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Large trees – increase the score across all monitoring sites to a 10, representing between 50% to 100% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8, RE 11.3.25, RE 11.11.1, RE 11.3.35 and RE 11.3.4 - Non-native plant cover – increase the score across all monitoring sites to a 10 representing <5% non-native plant cover at each site. • Site context - Average site context score for each RE is maintained or increased compared to the start quality score: - RE 11.10.7 – ≥ 7.03 - RE 11.11.15 – ≥ 7.38 - RE 11.11.15 regrowth – ≥ 1.15 - RE 11.4.2 – ≥ 8.50 - RE 11.4.2 regrowth – ≥ 1.15 - RE 11.5.8 – ≥ 7.60 - RE 11.3.25 – ≥ 8.53 - RE 11.11.1 – ≥ 7.69 - RE 11.3.35 – ≥ 8.85 • Species habitat index - Increase the threats to species score to a 15 through the implementation of the OAMP, specifically, implementation of successful pest animal control targeting wild dogs, active fire management, security through a legally binding mechanism and active management of the area for conservation purposes. The OAMP will be implemented, in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for koala, including specific management actions aimed at reducing the impact of threatening processes and improving the quality of koala habitat within the offset area, including: • Pest animal control – control measures will be implemented focussing on control of wild dogs within the offset area reducing the threat of predation on koala. • Livestock management – livestock will be excluded from the offset area except during strategic grazing events to control fuel loads and exotic pasture grasses. Periods of grazing will be followed by an extended period of rest and stocking rates will depend on seasonal conditions and pasture growth. • Weed control – weed hygiene restrictions and weed control activities will be undertaken within the offset area in order to reduce the threat of invasive weeds species (including exotic pasture grasses) to control fuel loads and to promote recruitment of koala habitat trees. • Fire management – fire management including establishment of fire breaks, control of fuel loads and implementation of low-intensity, controlled burns at appropriate intervals and times of year will be undertaken within the offset area. This will aim to reduce the risk of high intensity bushfires within the offset and assist with natural regeneration of vegetation communities, including koala food trees.
Confidence in result – future quality	80%	An OAMP will be developed in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for the species, and negotiations with the landholder. The OAMP will detail specific management objectives and outcomes aimed at improving the quality of species habitat. Ongoing monitoring of the offset area will also be undertaken to regularly assess the progress of the offset and ensure the OAMP achieves its required outcomes. The OAMP will support an efficient, effective, timely, transparent, scientifically robust and reasonable approach to managing and monitoring the offset area.
Risk of loss without offset	0.69%	The clearing of remnant vegetation in Queensland is regulated by the VM Act and the *Planning Act 2016* and associated policies and codes. This framework identifies vegetation as one of four categories, varying in their degree of restriction on permissible clearing. Under the VM Act, an application must be made to the Queensland Government to clear remnant vegetation (Category B) unless an exemption applies. The VM Act prevents broad-scale clearing of remnant vegetation for agriculture or other development activities; however, clearing of some remnant vegetation for resource development purposes (e.g. mining) is allowed. The VM Act allows clearing of category X areas without requiring landholders to obtain approval. Areas mapped as category X are not subject to vegetation clearing codes and therefore have the potential to be cleared by the current or future landholders at any time. Pastoralists are motivated to clear vegetation for a variety of reasons; however, historically a combination of favourable conditions and higher commodity prices have coincided with increased rates of clearing (Evans, 2016). Market conditions over the coming years look to continue to put pressure on pastoralists to increase production which inevitably leads to higher rates of clearing (M. Taylor pers comm). This is supported by clearing rates for regrowth vegetation increasing every year since 2012 (Steffen and Dean, 2018). Historical clearing has disproportionately impacted vegetation on the most fertile soil, such as eucalypt woodlands on alluvial flats and Brigalow vegetation on clay plains. Expert estimates of the likelihood of clearing regrowth of alluvial ecosystems are as high as 90% (C. Hempel pers comm). The previous landholder previously cleared areas of unregulated Category X vegetation across the property. Much of the regrowth areas of RE 11.4.2 across the property were cleared in 2008, with retention of these regrowth areas representing not only important habitat for koalas, but facilitating dispersal between remnant vegetation areas in upslope areas and fringing riparian habitats; both known to support koala populations on Mamelon. Notwithstanding the property-specific decisions influencing any landholder's decision to clear, the risk that areas will be cleared resulting in the complete loss of habitat for koala within the next 20 years, is considered to be 0.69%. This percentage reflects the average annual background rate of loss (2005 – 2014) within the Rockhampton Local Government Area as outlined in the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document prepared by Maseyk et al. (2017).

Input	Score	Justification
Risk of loss with offset	0%	The offset area will be secured through declaration as an area of high nature conservation value under section 19F of the VM Act.
Confidence in result – risk of loss	90%	The legally binding mechanism will be registered on the land title and bind all current and future land owners to ensure that the offset is protected.
Time over which loss is averted (years)	20	The offset area will be protected by a legally binding mechanism which will remain in effect as required by the applicable State and Commonwealth legislative requirements, therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.
Time until ecological benefit (years)	20	The implementation of site-specific land management actions through the development and application of an OAMP is expected to increase the quality of the offset area by improving vegetation condition and reducing potential threats to koala habitat. An ecological benefit is expected to be realised in 20 years.

* Non-remnant habitat refers to areas ground-truthed and observed to comprise regrowth (non-mature) vegetation, as distinct from remnant (largely intact, mature-like) vegetation. This terminology delineates assessment units for the purposes of assessing habitat condition, site context and species associations, and is not necessarily reflective of defined terms under the VM Act (i.e. remnant woody vegetation, high-value regrowth etc).

Table 3-21: Squatter pigeon offsets assessment guide input justifications (Mamelon)

Input	Score	Justification
Quality of impact area	7	Squatter pigeon habitat within the immediate vicinity of the project area was assessed and defined by Austecology (2020a and 2020b), whom concluded that the majority of records within the vicinity of the project area include grazed areas where dams are present. It was also noted that the concentration of records in these areas are likely a consequence of the ease of detection in these open grazed pastures close to tracks. Notwithstanding, Austecology (2020a) noted that squatter pigeons had also been recorded within remnant vegetation throughout the project area, including areas of RE 11.3.35, RE 11.4.2, RE 11.5.8a, and RE 11.11.15a, with the likely availability of a variety of locations with water throughout the year such as dams and standing water within the upper sections of Deep Creek. Clearing associated with direct and indirect (groundwater drawdown) impacts of the project on squatter pigeon habitat comprises ~307 ha of areas supporting RE 11.3.25, RE 11.4.2, RE 11.3.4, RE 11.3.35, RE 11.5.8 and RE 11.3.27. This comprises ~ 152 ha of known or potential remnant habitat, 150 ha of potential dispersal habitat and 5 ha of potential breeding habitat (Austecology 2020a). The quality of squatter pigeon habitat within the project impact area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality, identifying an impact habitat quality score of 7.
Quality of offset area	7	Squatter pigeon habitat within the offset area comprises ~2,667 ha of ground-truthed remnant RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 and areas of regrowth RE 11.4.2. The offset area comprises suitable foraging and breeding habitat for squatter pigeon and is located throughout Mamelon, in the vicinity of Tooloombah Creek, Mamelon Creek and Deep Creek as well as upslope areas with appropriate grassy woodland habitat. These RE are considered appropriate habitat for squatter pigeon, represented by eucalypt grassy woodland (remnant and regrowth(non-remnant)) on clay plains (RE 11.4.2), along alluvial channels (RE 11.3.25), remnant sand plain (RE 11.5.8) and old metamorphic and/or sedimentary surfaces (RE 11.10.7, RE 11.11.1 and RE 11.11.15). All areas of squatter pigeon offset habitat support eucalypt-dominated regrowth to remnant open-forest to open-woodland with a patchy, open grassy understorey. All offset areas are also within 3 km of permanent (artificial) or seasonal waterbodies, with much of the offset within 1 km. Targeted surveys conducted in October and November confirmed the presence of six squatter pigeon on Mamelon, within offset area, with a total of 25 confirmed records from Mamelon and adjacent Strathmuir during 2019. A further 58 squatter pigeon records are known from targeted surveys on those properties since March 2011. The quality of squatter pigeon habitat within the offset area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality. The current land use across much of Mamelon is cattle grazing, with grazing evident in all areas of squatter pigeon habitat. Grazing in these areas has resulted in reduced recruitment of native perennial grass species, as well as evidence of weeds and exotic pasture grasses, particularly *Parthenium*, prickly pear (*Opuntia spp.*) and lantana (*Lantana camara*) with incursion of *Megathyrsus maximus* in creek corridors corresponding to RE 11.3.25. The incursion of weeds and exotic pasture has the potential to increase the frequency of high intensity fires as they increase fuel loads causing habitat loss, and fragmentation of habitat. Pest animal species have been observed in the offset area, including foxes, feral cats and wild dogs; potential predators to squatter pigeon.
Future quality without offset management	7	Should an offset not be secured, the quality of habitat for the squatter pigeon within the next 20 years is expected to be maintained at a score of 7 based on the following: • Ongoing commercial livestock grazing across the property, with livestock favouring riparian areas along Tooloombah, Mamelon and Deep Creeks and surrounding remnant and regrowth areas resulting in: - Limited recruitment of native perennial grass species richness and cover - An increase in the presence of weeds and exotic pasture grasses, particularly buffel grass, *Parthenium*, prickly pear (*Opuntia spp.*) and lantana (*Lantana camara*) with incursions of weeds (particularly *Megathyrsus maximus*) away from Tooloombah and Mamelon Creek having the potential to further reduce recruitment of native perennial grasses. - Limited pest animal control, other than the landholder's general biosecurity obligation under the Biosecurity Act 2014 (Qld), increasing the risk of pest animal predation and decreasing the viability of the offset area to support squatter pigeon populations. - Potential for clearing of unregulated vegetation (associated particularly with regrowth RE 11.4.2) within the offset area by the current or future landholder. Clearing of regrowth RE 11.4.2 or other unregulated vegetation within the offset area will contribute to further fragmenting habitat connectivity through the landscape.
Future quality with offset management	8	An offset area for squatter pigeon on Mamelon will be secured and managed, to improve the quality of vegetation communities and accompanying habitat features contributing to squatter pigeon habitat. The quality of squatter pigeon habitat will be improved through an increase in site condition, site context and/or species stocking rate to achieve a future quality of 7. The following outlines increases in relevant attributes that in part or whole will contribute to the completion criteria being achieved (a future quality score of 8) over 20 years of active management under the OAMP: • Site condition – the following scores for each ecological attribute will be achieved through the implementation of specific management actions under the OAMP: - Native shrub species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25 - Native grass species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25

Input	Score	Justification
		- Native forb species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25 - Tree canopy height – increase the score across all monitoring sites to a 5 representing 70% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25 - Shrub canopy cover – increase the score across all monitoring sites to a 5 representing between 50% and 200% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25 - Native perennial grass cover – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2 (remnant and regrowth), RE 11.5.8 and RE 11.3.25 - Large trees – increase the score across all monitoring sites to a 10, representing between 50% to 100% of the benchmark for RE 11.10.7, RE 11.11.15, RE 11.4.2, RE 11.5.8 and RE 11.3.25 - Non-native plant cover – increase the score across all monitoring sites to a 10 representing <5% non-native plant cover at each site. • Site context - Average site context score for each RE is maintained or increased compared to the start quality score: - RE 11.10.7 – ≥ 7.03 - RE 11.11.15 – ≥ 7.38 - RE 11.4.2 – ≥ 8.50 - RE 11.4.2 regrowth – ≥ 1.15 - RE 11.5.8 – ≥ 7.60 - RE 11.3.25 – ≥ 8.53 • Species habitat index - Increase the threats to species score to a 15 through the implementation of the OAMP, specifically, implementation of successful pest animal control, active fire management, security through a legally binding mechanism and active management of the area for conservation purposes. The OAMP will be implemented, in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for squatter pigeon, including specific management actions aimed at reducing the impact of threatening processes and improving the quality of squatter pigeon habitat within the offset area, including: • Pest animal control – control measures will be implemented focussing on control of wild dogs, feral cats and foxes within the offset area reducing the threat of predation on squatter pigeon. • Livestock management – livestock will be excluded from the offset area except during strategic grazing events to control fuel loads and exotic pasture grasses. Periods of grazing will be followed by an extended period of rest and stocking rates will depend on seasonal conditions and pasture growth. • Weed control – weed hygiene restrictions and weed control activities will be undertaken within the offset area in order to reduce the threat of invasive weeds species (including exotic pasture grasses) to control fuel loads and to promote recruitment of foraging and shelter trees. • Fire management – fire management including establishment of fire breaks, control of fuel loads and implementation of low-intensity, controlled burns at appropriate intervals and times of year will be undertaken within the offset area. This will aim to reduce the risk of high intensity fires within the offset and assist with natural regeneration of vegetation communities, including a natural and diverse understorey perennial grass cover important for squatter pigeon.
Confidence in result – future quality	80%	An OAMP will be developed in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for the species, and negotiations with the landholder. The OAMP will detail specific management objectives and outcomes aimed at improving the quality of species habitat. Ongoing monitoring of the offset area will also be undertaken to regularly assess the progress of the offset and ensure the OAMP achieves its required outcomes. The OAMP will support an efficient, effective, timely, transparent, scientifically robust and reasonable approach to managing and monitoring the offset area.
Risk of loss without offset	0.69%	The clearing of remnant vegetation in Queensland is regulated by the VM Act and the *Planning Act 2016* and associated policies and codes. This framework identifies vegetation as one of four categories, varying in their degree of restriction on permissible clearing. Under the VM Act, an application must be made to the Queensland Government to clear remnant vegetation (Category B) unless an exemption applies. The VM Act prevents broad-scale clearing of remnant vegetation for agriculture or other development activities; however, clearing of some remnant vegetation for resource development purposes (e.g. mining) is allowed. The VM Act allows clearing of category X areas without requiring landholders to obtain approval. Areas mapped as category X are not subject to vegetation clearing codes and therefore have the potential to be cleared by the current or future landholders at any time. Pastoralists are motivated to clear vegetation for a variety of reasons; however, historically a combination of favourable conditions and higher commodity prices have coincided with increased rates of clearing (Evans, 2016). Market conditions over the coming years look to continue to put pressure on pastoralists to increase production which inevitably leads to higher rates of clearing (M. Taylor pers comm). This is supported by clearing rates for regrowth vegetation increasing every year since 2012 (Steffen and Dean, 2018). Historical clearing has disproportionately impacted vegetation on the most fertile soil, such as eucalypt woodlands on alluvial flats and Brigalow vegetation on clay plains. Expert estimates of the likelihood of clearing regrowth of alluvial ecosystems are as high as 90% (C. Hempel pers comm). The previous landholder previously cleared areas of unregulated Category X vegetation across the property. Much of the regrowth areas of RE 11.4.2 across the property were cleared in 2008, with retention of these regrowth areas representing not only important foraging and breeding habitat for squatter pigeon, but facilitating dispersal between remnant vegetation areas in upslope areas and fringing riparian habitats. Notwithstanding the property-specific decisions influencing any landholder's decision to clear, the risk that areas will be cleared resulting in the complete loss of habitat for squatter pigeon within the next 20 years, is considered to be 0.69%. This percentage reflects the average annual background rate of loss (2005 – 2014) within the Rockhampton Local Government Area as outlined in the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document prepared by Maseyk et al. (2017).

Input	Score	Justification
Risk of loss with offset	0%	The offset area will be secured through declaration as an area of high nature conservation value under section 19F of the VM Act.
Confidence in result – risk of loss	90%	The legally binding mechanism will be registered on the land title and bind all current and future land owners to ensure that the offset is protected.
Time over which loss is averted (years)	20	The offset area will be protected by a legally binding mechanism which will remain in effect as required by the applicable State and Commonwealth legislative requirements, therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.
Time until ecological benefit (years)	20	The implementation of site-specific land management actions through the development and application of an OAMP is expected to increase the quality of the offset area by improving vegetation condition and reducing potential threats to squatter pigeon habitat. An ecological benefit is expected to be realised in 20 years.

Table 3-22: Ornamental snake offsets assessment guide input justifications [redacted]

Input	Score	Justification
Quality of impact area	5	Ornamental snake habitat within the immediate vicinity of the project area was limited, and significant residual impacts were considered to be limited to areas of degraded remnant RE 11.3.25, corresponding to a tributary of Deep Creek located within ML 80187. While the species has been recorded in remnant Brigalow vegetation (RE 11.4.9) 3.5 km west of the northern boundary of ML 80187 in September 2011 , targeted surveys for ornamental snake since 2011 have failed to confirm the presence of the species within the impact area or tributaries of Deep Creek. Targeted surveys in regrowth areas adjacent to the tributaries of Deep Creek in May 2020 indicated much of the gilgai communities support a sandy, clay, loam surface rather than deep cracking clays the species is typically associated with. Consequently, any cracks in the clays were observed as being filled by surface sand, affording little foraging or shelter habitat potential for ornamental snake. The quality of ornamental snake habitat within the project impact area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality, identifying an impact habitat quality score of 5.
Quality of offset area	7	Ornamental snake habitat within the offset area comprises 121 ha of ground-truthed remnant RE 11.3.3 and RE 11.3.25. This habitat is located in the north of [redacted] on floodplain gilgai soils dominated by *Eucalyptus coolabah* grassy woodland, dissected by the stream order 3 tributary of the Belyando River. These two REs are considered suitable habitat for ornamental snake; with areas of RE 11.3.3 supporting large, deep gilgai on deep cracking clays, and the small area of dissecting watercourse supporting cracking clays as well as intermittent pools of water. These pools of water were confirmed to support a number of preferred frog prey species of the ornamental snake, including flooplain frog (*Litoria inermis*), spotted marsh frog (*Limnodynastes tasmaniensis*), desert tree frog (*Litoria rubella*), striped burrowing frog (*Cyclorana alboguttata*), New Holland frog (*Cyclorana novaehollandiae*) and green tree frog (*Litoria caerulea*). Targeted spotlighting surveys conducted in May 2020 confirmed the presence of ornamental snake ~1 km from the offset area along the northern boundary of [redacted] in an area of RE 11.3.3 consistent with habitat in the offset area. As a consequence of the cooler weather at the time of surveying, it is likely that greater numbers of ornamental snake will be detectable during the warmer months in other areas of [redacted] including throughout the offset area. The quality of ornamental snake habitat within the offset area was calculated generally in accordance with the Guide to Determining Terrestrial Habitat Quality. The current land use across much of [redacted] is cattle grazing, with grazing evident in all areas of ornamental snake habitat. Grazing in these areas has resulted in trampling of gilgai, as well as evidence of weeds and exotic pasture grasses, particularly *Parthenium*, mimosa bush (*Vachellia farnesiana*) and *Megathyrsus maximus*, with the greatest density of weeds (particularly *M. maximus*) within the bed and banks of Belyando River, corresponding to RE 11.3.25. The incursion of weeds and exotic pasture into areas of RE 11.3.3 has the potential to increase the frequency of high intensity fires as they increase fuel loads causing loss of critical microhabitat for ornamentals snake and impacts on frog prey species.
Future quality without offset management	7	Should an offset not be secured, the quality of habitat for the ornamental snake within the next 20 years is expected to be maintained at a score of 7 based on the following: • Ongoing commercial livestock grazing across the property, with livestock favouring riparian and adjacent grassy alluvial coolabah woodlands associated with the Belyando River and surrounding remnant areas resulting in: - Trampling of critical microhabitat features for the ornamental snake (e.g. coarse woody debris and cracking clays), but also altering of water quality supporting prey species (e.g. frogs) for ornamental snake when rains fill gilgai and pools of retained water along Belyando River within the proposed offset area. - The landholders have indicated they intend to further develop the property to allow for heavier stocking rates if an offset arrangement does not occur. This has the potential to continue to degrade the proposed ornamental snake offset area, which is currently already impacted by weed encroachment, particularly around existing watering points within the proposed offset area - Continued presence of weeds and exotic pasture grasses, particularly *Parthenium*, mimosa bush (*Vachellia farnesiana*) and *Megathyrsus maximus*. - Limited pest animal control, other than the landholder's general biosecurity obligation under the Biosecurity Act 2014 (Qld), increasing the risk of pest animal predation and decreasing the viability of the offset area to support ornamental snake populations
Future quality with offset management	8	An offset area for ornamental snake on [redacted] will be secured and managed, to improve the quality of vegetation communities and accompanying habitat features contributing to ornamental snake habitat. The quality of ornamental snake habitat will be improved through an increase in site condition, site context and/or species stocking rate to achieve a future quality of 8. The following outlines increases in relevant attributes that in part or whole will contribute to the completion criteria being achieved (a future quality score of 8) over 20 years of active management under the OAMP: • Site condition – the following scores for each ecological attribute will be achieved through the implementation of specific management actions under the OAMP: - Native shrub species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.3.3 and RE 11.3.25 - Native grass species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.3.3 and RE 11.3.25 - Native forb species richness – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.3.3 and RE 11.3.25 - Tree canopy height – increase the score across all monitoring sites to a 5 representing 70% of the benchmark for RE 11.3.3 and RE 11.3.25

Input	Score	Justification
		- Shrub canopy cover – increase the score across all monitoring sites to a 5 representing between 50% and 200% of the benchmark for RE 11.3.3 and RE 11.3.25 - Native perennial grass cover – increase the score across all monitoring sites to a 5 representing > 90% of the benchmark for RE 11.3.3 and RE 11.3.25 - Large trees – increase the score across all monitoring sites to a 10, representing between 50% to 100% of the benchmark for RE 11.3.3 and RE 11.3.25 - Non-native plant cover – increase the score across all monitoring sites to a 10 representing <5% non-native plant cover at each site. • Site context - Average site context score for each RE is maintained or increased compared to the start quality score: - RE 11.3.3 – ≥ 9.23 - RE 11.3.25 – ≥ 9.81 • Species habitat index - Increase the threats to species score to a 15 through the implementation of the OAMP specifically implementation of successful pest animal control targeting feral cats and foxes as well as degradation of habitat by feral pigs, active fire management, security through a legally binding mechanism and active management of the area for conservation purposes. The OAMP will be implemented, in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for ornamental snake, including specific management actions aimed at reducing the impact of threatening processes and improving the quality of ornamental snake habitat within the offset area, including: • Pest animal control – control measures will be implemented focussing on control of feral cats and foxes within the offset area reducing the threat of predation on ornamental snake (and their prey), while also controlling degradation of habitat by feral pigs. • Livestock management – livestock will be excluded from the offset area except during strategic grazing events to control fuel loads and exotic pasture grasses. Any periods of grazing will be followed by an extended period of rest and stocking rates will depend on seasonal conditions and pasture growth. • Weed control – weed hygiene restrictions and weed control activities will be undertaken within the offset area in order to reduce the threat of invasive weeds species (including exotic pasture grasses) to control fuel loads and to reduce threat of smothering of gilgai habitat and watercourse habitat for frog prey. • Fire management – fire management including establishment of fire breaks, control of fuel loads outside of the offset area only, with no controlled burns within the offset area. This in combination with strategic grazing (if required) will aim to reduce the risk of high intensity fires within the offset and assist with natural regeneration of vegetation communities.
Confidence in result – future quality	80%	An OAMP will be developed in accordance with approved conservation advice, recovery plans and recommended threat abatement and management advice for the species, and negotiations with the landholder. The OAMP will detail specific management objectives and outcomes aimed at improving the quality of species habitat. Ongoing monitoring of the offset area will also be undertaken to regularly assess the progress of the offset and ensure the OAMP achieves its required outcomes. The OAMP will support an efficient, effective, timely, transparent, scientifically robust and reasonable approach to managing and monitoring the offset area.
Risk of loss without offset	0.42%	The clearing of remnant vegetation in Queensland is regulated by the VM Act and the *Planning Act 2016* and associated policies and codes. This framework identifies vegetation as one of four categories, varying in their degree of restriction on permissible clearing. Under the VM Act, an application must be made to the Queensland Government to clear remnant vegetation (Category B) unless an exemption applies. The VM Act prevents broad-scale clearing of remnant vegetation for agriculture or other development activities; however, clearing of some remnant vegetation for resource development purposes (e.g. mining) is allowed. The VM Act allows clearing of category X areas without requiring landholders to obtain approval. Areas mapped as category X are not subject to vegetation clearing codes and therefore have the potential to be cleared by the current or future landholders at any time. Pastoralists are motivated to clear vegetation for a variety of reasons; however, historically a combination of favourable conditions and higher commodity prices have coincided with increased rates of clearing (Evans, 2016). Market conditions over the coming years look to continue to put pressure on pastoralists to increase production which inevitably leads to higher rates of clearing (M. Taylor pers comm). This is supported by clearing rates for regrowth vegetation increasing every year since 2012 (Steffen and Dean, 2018). Historical clearing has disproportionately impacted vegetation on the most fertile soil, such as eucalypt woodlands on alluvial flats and Brigalow vegetation on clay plains. Expert estimates of the likelihood of clearing regrowth of alluvial ecosystems are as high as 90% (C. Hempel pers comm). The current landholder has expressed an interest in increasing pastoral activities in the offset area if not otherwise protected, being highly productive alluvial-derived soils with a rich native grass cover. Notwithstanding the property-specific decisions influencing any landholder's decision to clear, the risk that areas will be cleared resulting in the complete loss of habitat for ornamental snake within the next 20 years, is considered to be 0.42%. This percentage reflects the average annual background rate of loss (2005 – 2014) within the Isaac Local Government Area as outlined in the *Guidance for deriving 'Risk of Loss' estimates when evaluating biodiversity offset proposals under the EPBC Act* document prepared by Maseyk et al. (2017).
Risk of loss with offset	0%	The offset area will be secured through declaration as an area of high nature conservation value under section 19F of the VM Act.
Confidence in result – risk of loss	90%	The legally binding mechanism will be registered on the land title and bind all current and future land owners to ensure that the offset is protected.
Time over which loss is averted (years)	20	The offset area will be protected by a legally binding mechanism which will remain in effect as required by the applicable State and Commonwealth legislative requirements, therefore, the time over which loss is averted is considered to be the maximum allowable time of 20 years.
Time until ecological benefit (years)	20	The implementation of site-specific land management actions through the development and application of an OAMP is expected to increase the quality of the offset area by improving vegetation condition and reducing potential threats to ornamental snake habitat. An ecological benefit is expected to be realised in 20 years.

3.6.4.5.5 Proposed offset areas do not provide connectivity with habitat in the Southern Brigalow region.

CQC Response

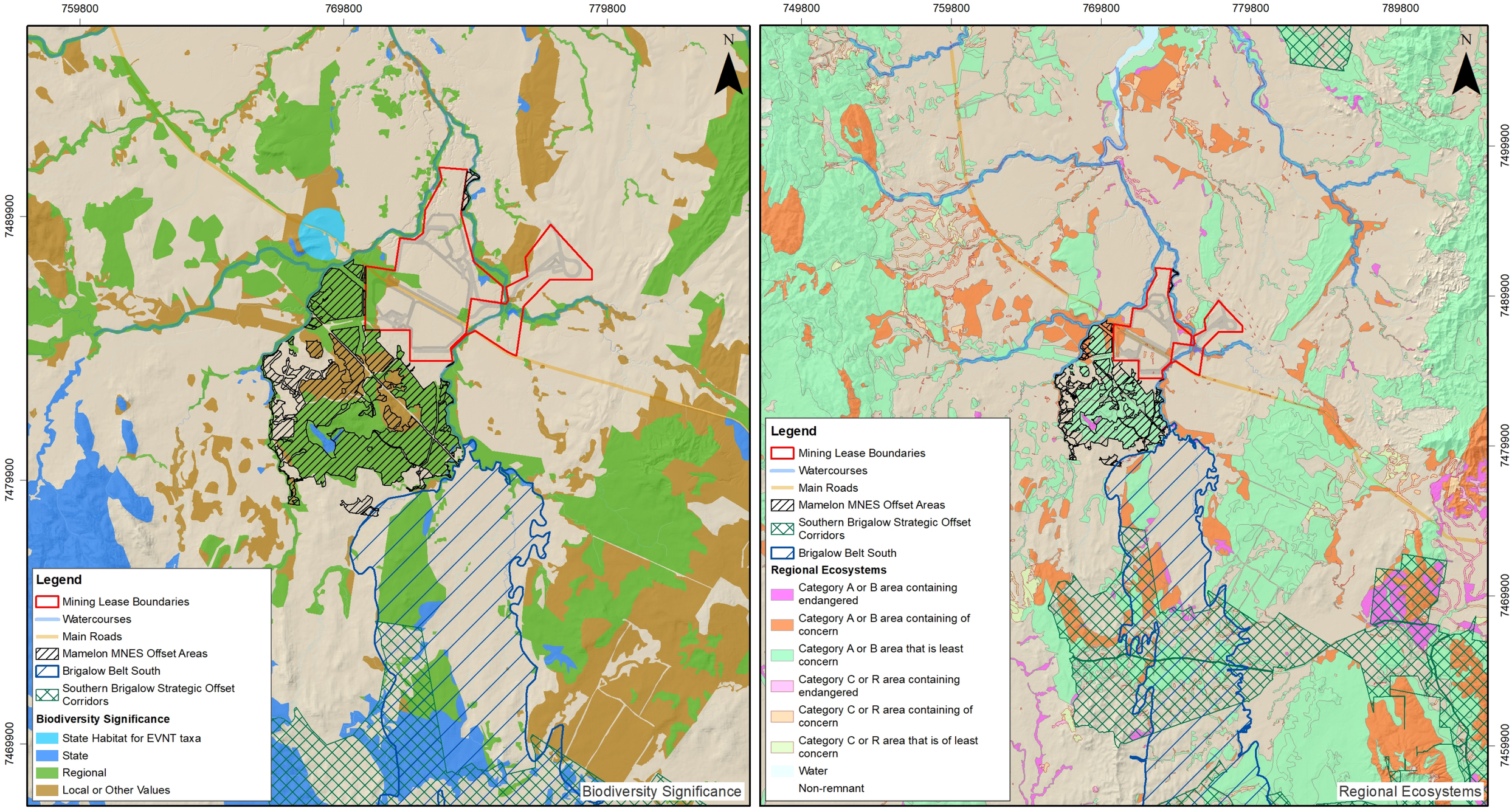
The Mamelon offset area is predominantly within the Brigalow Belt North bioregion, and straddles the Marlborough Plains and Nebo-Connors Ranges subregions, with a very small area in the very south-east intersecting the Boomer Range subregion within the Brigalow Belt South bioregion.

As illustrated in Figure 3-14, the Southern Brigalow Belt strategic offset corridor is located 4.5 km to the south of the Mamelon offset area, and the offset area is indirectly connected to this mapped corridor by a large patch of remnant vegetation containing endangered, of concern and least concern regional ecosystems.

Whilst the Mamelon offset area is not directly connected to the Southern Brigalow Belt strategic offset corridor, the offset is flanked by Regional Significant Corridors along the east and west boundaries of the property, corresponding to Deep Creek and Mamelon Creek, respectively (Figure 3-14). These conservation corridors have been mapped as part of the Queensland Government's Biodiversity Planning Assessments (BPA) which assess the biodiversity significance of land in a bioregion. The mapping of corridors within the Brigalow Belt Bioregion, in which the Mamelon property is located, has focussed on those corridors that link adjacent bioregions or connect wildlife refugia.

In addition, as illustrated in Figure 3-14, within the wider landscape Mamelon is well connected to large remnant habitat patches to the west; remaining contiguous with an extensive tract of remnant vegetation, which includes Tooloombah Creek Conservation Park, immediately to the north-west of Mamelon. Habitat to the south and south-west of the property remain relatively patchy but maintain connected to extensive habitat associated with Broadsound Range (located to the south and west). Broadsound Range is itself part of a State-wide ecological corridor mapped under the BPA, as are coastal lands to the north and east.

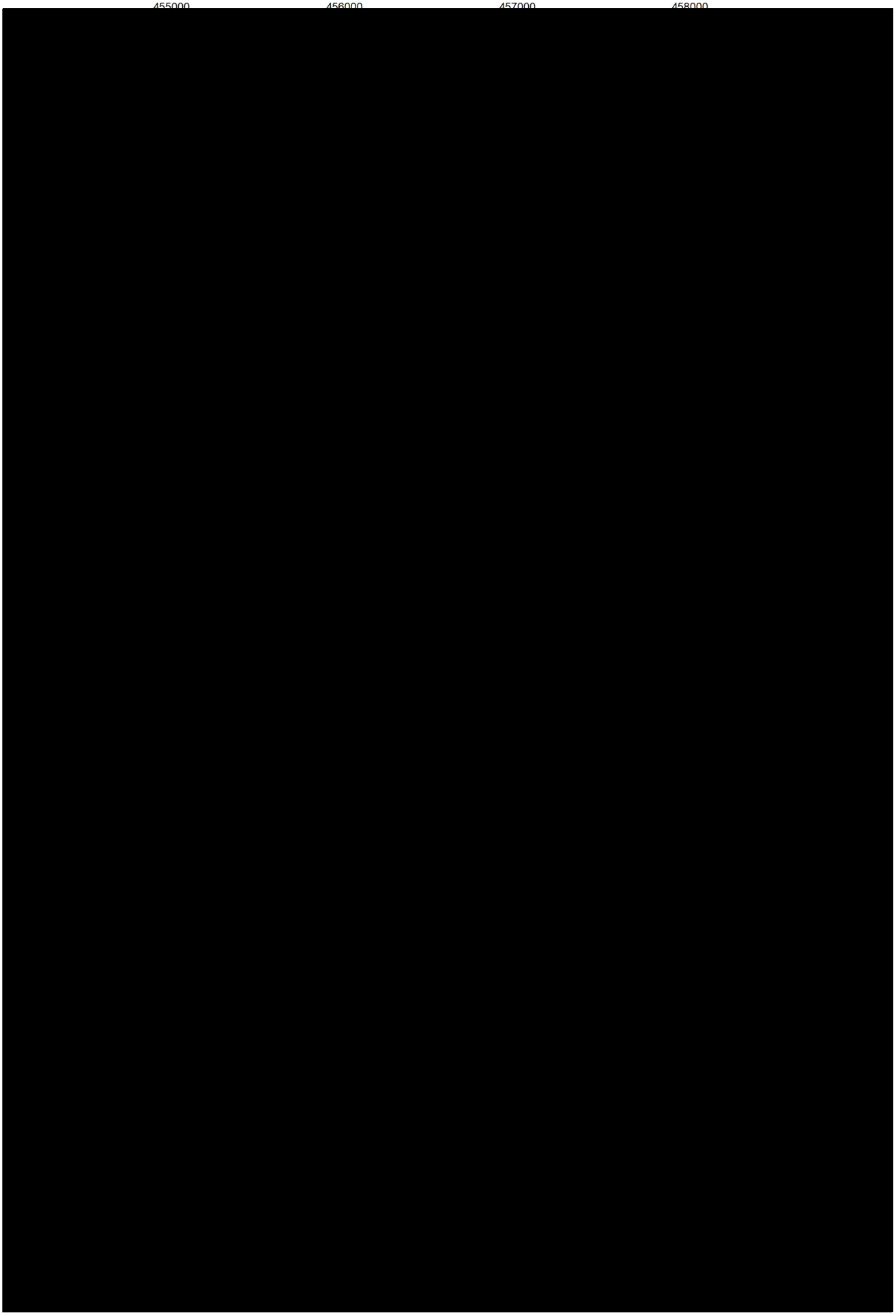
The [redacted] property is situated in the Brigalow Belt bioregion, Belyando Downs subregion, and is adjacent to the Epping Forest National Park to the east. The offset area on the [redacted] property is mapped within an area identified as a Priority 3 – Strategic Footprint of the Galilee Basin Strategic Offset Investment Corridor (SOIC; DEHP 2013) (Figure 3-15). The Queensland Government has identified SOICs in each bioregion of Queensland with local input from regional natural resource management groups, ecology experts, landholders and local government. SOICs are identified as some of the best places in the landscape for environmental offsets as they mainly consist of core areas of largely intact remnant vegetation, generally associated with protected areas such as national parks, or areas that provide important links between those core areas.



Sources: Mining Leases: CQC 2020 | Infrastructure: CQC 2020 | Watercourses: DNRME 2018 | Roads: DNRME 2018 | Bioregions: DAWE 2017 | Regional Ecosystems: DNRME 2019 | Biodiversity Significance: DES 2018 | Offset Area: Co2 2020 | Southern Brigalow Strategic Offset Corridors: DEHP 2016

A4 Scale 1:200,000 0 2 4
GDA 1994 MGA Zone 55 km
CQCSCP-07-Fig03-19-Offsets-Mamelon-201006, 6 Oct 2020

Figure 3-14: Mamelon offset connectivity


455000
456000
457000
458000

3.6.5 Queensland Department of State Development, Manufacturing, Infrastructure and Planning (Office of the Co-ordinator-General)

3.6.5.1 Comment 1

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.4.2 of Chapter 19B Chapter 6 and 7 of Appendix 17
Submitters Reference (if provided)	30.1		

Details of the Submission

The matter has been partially addressed.

Section 19.4.2 of Chapter 19B includes a summary of relevant stakeholders identified as relevant to the Project, and consultation activities. Sections 6 and 7 of Appendix 17 provide a more detailed overview of the engagement undertaken and issues raised by stakeholders.

Section 7.1 provides some assessment of the concerns raised by landholders (particularly regarding surface and groundwater impacts), and whether these concerns are validated by the outcomes of the EIS technical studies. However, this analysis has not been conducted for the concerns raised by other stakeholder groups such as the local community and councils.

While the revised SEIS has demonstrated improvement (in comparison to the May 2018 SEIS), it still does not adequately demonstrate how stakeholder issues have been considered and addressed, and how feedback from stakeholders has informed the SIA process including the baseline analysis and impact assessment.

Additional issues noted in the revised SEIS include (but are not limited to):

- there is inconsistency between the stakeholders listed in Section 19.4.2 and the stakeholders / stakeholder groups listed in Section 6.2, Appendix 17
- Section 7.2 (Appendix 17) references feedback from residents of Clairview, however it is not clear how this feedback was received (e.g. is it based on submissions received for the EIS, or did Clairview residents attend the community meeting in Marlborough?) and
- Section 7.2 (Appendix 17) discusses acquisition of land by Defence, however no further context is provided, including the relevance of this acquisition to the project or communities.

Section 7.3 (Appendix 17) only lists key areas of discussion with local governments (who are a key stakeholder in the SIA process) but does not provide a description of their issues or concerns, or how these have been addressed.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments or the requirements of Appendix 4, Clauses 4 and 5 of the ToR. The proponent has not adequately demonstrated how stakeholder feedback has been considered, and how it has informed the SIA. This has affected the adequacy of other aspects of the SIA including the baseline analysis and impact assessment.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the (SIA - Appendix 14c) have been comprehensively revised (i.e. rewritten) to address the previous comments and the requirements of Appendix 4,

Clauses 4 and 5 of the ToR. As a result of this revision there are no longer any inconsistencies between the contents of Chapter 19B and the SIA contained within Appendix 14c.

Section 5 of Appendix 14c and Section 19B.2.5 in chapter 19B comprehensively describe the stakeholder engagement undertaken throughout the EIS to inform the SIA, including the additional engagement undertaken in producing the revised SIA. Table 12 in Appendix 14c provides a summary list of issues raised by the various stakeholders, and Sections 5.3.1 through 5.3.7 describes the nature of these issues in depth.

This consultation has informed the revised SIA. Examples of how the SIA is infused with information gained through stakeholder engagement can be found in be found in Appendix 14c in Section 6.2 where community values are discussed, Section 6.3.2 where consultation has expanded information about the age profile, and in Section 6.4 where consultative information from Department of Housing and Public Works have enriched the description of housing market dynamics. Consultation has further informed the assessment of many impacts in Section 7 of Appendix 14c, including demand for health and emergency services, concerns around amenity impacts etc.

The acquisition of properties in the local study area by the Department and Defence, and community responses to it is expanded upon in Section 6.2 of Appendix 14c. It is relevant for this SIA as it provides an important context to the existing social environment, including increasing outmigration and community division.

3.6.5.2 Comment 2

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.2, Chapter 19B, Relevant Legislation and Guidelines Chapter 4, Appendix 17, Legislative Context
Submitters Reference (if provided)	30.2		

Details of the Submission

This matter has been addressed.

The proponent has updated the regulatory review to more clearly articulate the relevance of the legislative and policy framework to the project.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.3 Comment 3

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 3.2 of Appendix 17 Section 19.5 of Chapter 19B
Submitters Reference (if provided)	30.3		

Details of the Submission

This matter has been partially addressed.

As required by Appendix 4, Clause 3 of the ToR, the social baseline should be based on qualitative, quantitative and participatory methods.

The social baseline in the revised SEIS is based almost exclusively on quantitative secondary data sources.

Qualitative and participatory data has only been used minimally (for example reporting that acquisition of land by the Department of Defence is viewed as a change process placing pressure on the community). This data is required by the ToR and should be sourced through engagement with affected communities.

Section 7 of Appendix 17 indicates that some of the required engagement has occurred, however little of the data which may have been obtained is presented in the baseline. It is also unlikely that the engagement activities described in Section 7 of Appendix 17 would have been of sufficient scope to have provided adequate data due to the lack of more targeted sessions such as focus group discussions with key impacted stakeholder groups, or structured qualitative surveys.

The lack of primary qualitative and participative data in the social baseline also affects other areas of the SIA. For example, Clause 7 of Appendix 4 of the ToR requires the impact assessment to consider factors such as *"lifestyles and amenity, community values…and the health and social/cultural wellbeing of families and communities*". These characteristics require sufficient qualitative and participatory data to provide an adequate benchmark against which potential impacts can be assessed.

The social baseline should include indicators for these characteristics, as it would provide a benchmark against which to conduct the impact assessment.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments or the requirements of Clause 3 of Appendix 4 of the ToR. The proponent has not provided sufficient qualitative and participatory data in the social baseline. This lack of information has in turn affected the impact assessment.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the (SIA - Appendix 14c) have been comprehensively revised (i.e. rewritten) to address the previous comments and the requirements of Clause 3 of Appendix 4 of the ToR. The submitters comment has been addressed by the additional stakeholder consultation undertaken that is reported in Section 5 of Appendix 14c and Section 19B.2.5 in chapter 19B. The methods section of the SIA (Section 2 of Appendix 14c) provides additional information about the consultative methods used to inform the SIA. The data acquired through consultative methods has further informed the social baseline and impact assessment process.

As a key data source to generate community based data, tailored, semi-structured SIA interviews with community members were carried out, in addition to meetings with local councils and government departments, and the previous community meetings.

Examples of where the social baseline is informed by consultative data can be found in Appendix 14c Section 6.2 which addresses community values, Section 6.3.2 regarding changes to the age profile, and Sections 6.4.1 and 6.4.2 which describes housing matters. These, and other aspects of the social baseline, have formed the basis for the SIA in Section 7 of the SIA.

3.6.5.4 Comment 4

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.4.1.4 of Chapter 19B Section 1.4 of Appendix 17
Submitters Reference (if provided)	30.4		

Details of the Submission

This matter has been partially addressed.

Chapter 19B and Appendix 17 appear to use the terms 'study area' and 'area of influence' interchangeably. This inconsistent terminology creates confusion when interpreting the report. Further, the application of the term 'study area' is not clearly defined.

For example, Section 11 of Appendix 17 discusses cumulative social impacts 'within the study area'. Section 1.4 of Appendix 17 is entitled 'Study Area' but does not clearly define a 'study area'. Rather, it states the social impacts of the Project have been assessed at different geographic levels, being Local Area, Nearby Rural Centres and Nearby Urban Centres. These areas are referred to as 'areas of influence' in Section 8 of Appendix 17. Additionally, Figure 1-1 of Appendix 17 is entitled 'Primary study area relevant to the Project', however it does not identify the boundaries. Several of the communities (e.g. Ogmore or Yeppoon) which are identified in Section 1.4 are not shown in the figure.

Section 19.4.1.4 of Chapter 19B presents a different description of the study area to Appendix 17, with no rationale provided for the inconsistency. The term 'area of influence' is used in Section 19.6 of Chapter 19B, but the areas described are not defined in the chapter.

Further, the study area outlined in Section 1.4 of Appendix 17 does not correlate with the social baseline presented in Section 5 of Appendix 17. For example, the study area description in Section 1.4 states 'Nearby Rural Centres' to include Yaamba, The Caves, St Lawrence and Clairview; however, no baseline is provided for the rural centres of Yaamba and The Caves. In addition, the geographic level of 'Nearby Urban Centres' was stated to include Yeppoon and Rockhampton, but no baseline data is provided for these urban centres.

If these localities were selected for inclusion in the SIA study areas as they are identified as being potential labour sources for the Project, relevant baseline data should be provided on these localities, such as on labour market characteristics.

Suggested Solutions, Recommendations and Conditions

The revised EIS does not adequately address the previous comment, or requirements of Clause 2 of Appendix 4 of the TOR. The proponent has not clearly defined the study area(s) for the project and has presented conflicting descriptions in Section 19.4.1.4 of Chapter 19B and Section 1.4 of Appendix

17. This has resulted in various inconsistencies and/or inadequacies in the presentation and interpretation of baseline data and the analysis of potential impacts.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the (SIA - Appendix 14c) have been comprehensively revised and the previous comment and the requirements of Clause 2 of Appendix 4 of the ToR have been addressed. In particular, this matter is addressed in Section 2.3.1, 2.3.2 and 2.3.3 of the SIA in Appendix 14c and Section 19B.1.4.1 in chapter 19B. These sections define the local study area as the state suburbs within an approximate one hour drive of the site, including Clairview, St Lawrence, Ogmore, Marlborough, Canoona and Kunwarara. The regional study area is defined as the Central Queensland SA4 and Broadsound – Nebo SA2, to align with the economic impact assessment. A state study area is provided for reference. These geographical definitions have been used throughout the SIA, primarily when presenting the existing social environment in Section 6 and the social impact identification and assessment in Section 7 of Appendix 14c.

3.6.5.5 Comment 5

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.4.2.1, Chapter 19A
Submitters Reference (if provided)	30.5		

Details of the Submission

This matter has been partially addressed.

The ‘macro-level’ geographic boundaries for the SIA study area and economic study area remain inconsistent.

Section 19.4.2.1 of Chapter 19A defines the economic study area as comprising Livingstone Shire Council LGA (representing the local area), and two ABS Statistical Areas (representing the regional areas). This is inconsistent with the ‘macro-level’ study area defined for the SIA (Section 1.4, Appendix 17, SIA), with the social study area comprising various geographic levels including the ‘local region’, which encompasses the LGAs of Livingstone Shire, Rockhampton Regional and Isaac Regional. This matter is further complicated by the conflicting and inconsistent description and application of the study area in Chapter 19B and Appendix 17 of the revised SEIS.

While the study areas at the local level could be inconsistent due to data availability, the ‘macro-level’ study area should be consistent where possible, as identified economic impacts are likely to lead to direct or indirect social impacts.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments. Inconsistencies remain between the outer boundaries of the social and economic study areas.

Proponent Response

The social chapter (19B) of this SEIS (v3) and the SIA (Appendix 14c) have been comprehensively revised to address this matter. Section 2.3.2 of the of Appendix 14c and Section 19B1.4.1 in chapter 19B define the regional study area as Central Queensland SA4 and Broadsound – Nebo SA2,

consistent with the study area for the economic impact assessment in the Economics chapter - Chapter 19A.

3.6.5.6 Comment 6

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.5, Chapter 19B Section 5, Appendix 17
Submitters Reference (if provided)	30.6		

Details of the Submission

This matter has been partially addressed.

It is acknowledged that Section 19.5 of Chapter 19B has been updated to include further secondary data about some of the nearby rural centres within the defined SIA study area. However, the social baseline still does not incorporate enough participative primary data required to better understand relevant community characteristics, particularly qualitative characteristics. The lack of participative primary data on community characteristics, such as community values and cohesion, results in a lack of a benchmark against which potential social impacts can be assessed.

For example, Clause 7 of Appendix 4 of the ToR requires the impact assessment to consider factors such as *"lifestyles and amenity, community values…and the health and social/cultural wellbeing of families and communities*". While discussion of impacts on community values is provided in Section 8.2.6 of Appendix 17, the inclusion of baseline data on community values would validate the findings presented in the impact assessment.

As noted in Comment #3, it is likely that some of the required data would have been obtained during the community engagement activities undertaken in support of the EIS, SEIS and revised SEIS, however this data has not been adequately integrated into the social baseline.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments or the requirements of Clause 3 of Appendix 4 of the TOR. The proponent has not provided sufficient participative primary data in the social baseline. This has affected the baseline analysis and impact assessment.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the (SIA – contained in Appendix 14c) have been comprehensively revised and the previous comment and the requirements of Clause 3 of Appendix 4 of the ToR have been addressed. In particular, this matter has been addressed through the additional consultation undertaken for the revised SIA. Section 5 of Appendix 14c and Section 19B.2.5 in Chapter 19B describe the process of community engagement, and the findings from this process has fed into the social baseline (Section 6 of Appendix 14c and Section 19B.3 of chapter 19B) in numerous aspects. In particular, values and issues such as community cohesion, community values, social and cultural wellbeing are discussed in Sections 5.3.3, 5.3.4 and 6.2 of Appendix 14c and Section 19.B.3.4 in chapter 19B.

3.6.5.7 Comment 7

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19B Appendix 17
Submitters Reference (if provided)	30.7		

Details of the Submission

This matter has been addressed.

The proponent has provided a rationale for not including the Woorabinda Aboriginal Shire Council within the Project's study area.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.8 Comment 8

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.5.3, Chapter 19A Section 19.9, Chapter 19B Section 11, Appendix 17
Submitters Reference (if provided)	30.8		

Details of the Submission

This matter has been partially addressed.

Section 19.5.3 of Chapter 19A has been amended to include additional explanation for determining relevant major developments. Further, Chapter 19B and Appendix 17 include baseline information on 'local projects' within the three relevant LGAs.

Section 11 of Appendix 17 and Section 19.9 of Chapter 19B present the cumulative impact assessment, which *'examines the potential implications and impacts of a number of major projects being developed within the study area'*. However, Appendix 17 and Chapter 19B contain limited baseline information on major projects being developed within the study area (as summarised under 'local projects'). The more detailed information is provided in Chapter 19A but is not cross-referenced.

Additionally, no quantification of potential cumulative impacts is provided, for example a high-level analysis of cumulative workforce demand.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments. In particular, the proponent has not provided any quantitative analysis of cumulative impacts such as cumulative workforce demand.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the SIA (contained in Appendix 14a) have been comprehensively revised and the previous comment has been addressed. A revised cumulative impact assessment has been undertaken to address this comment. The method for identifying and assessing relevant projects for cumulative impacts is presented in Section 2.2.4 of Appendix 14a, and the cumulative impact assessment is described in Section 7.4 of the same report as well as Section 19B.4.4 in chapter 19B. However, it is important to note that many of the projects which pose the highest risk of causing cumulative social impacts have followed approvals pathways that do not appear to require social or economic assessments and that these have not published important data such as workforce demand data. In the cases these are publicly available the data sometimes lack specificity as to timing of workforce demand. The cumulative impact assessment is therefore largely qualitative and describes potential cumulative social impact pathways.

3.6.5.9 Comment 9

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 5, Appendix 17 Section 19.5, Chapter 19B
Submitters Reference (if provided)	30.9		

Details of the Submission

This matter has been partially addressed.

Minor improvements have been made to the data on the capacity and availability of community services presented in Section 5 of Appendix 17 and Section 19.5 of Chapter 19B, for example provision of travel distances from the mine to nearby fire stations. However, the information provided does not give a clear indication of the current demand on many of these services – this is necessary to inform the subsequent impact assessment.

For example, Section 5.4.5 pf Appendix 17 notes *that "The region includes 18 private schools, 22 state primary schools, four state high schools…"*, but there is no information given about the capacity of these schools or their ability to take on extra students. There is also no indication of which schools are "local" (i.e. likely to be used by children who may move to the local community if a parent is employed by the project). This in turn affects the impact assessment in Section 8.2.16.2 of Appendix 17 as there is no benchmark against which the impact of potential additional students in the local area can be assessed. The impact assessment has deemed it unlikely that community services will be significantly impacted, as large-scale in-migration is not expected for the project, however this assertion can be more reliably validated if a quantitative analysis is used.

While some additional detail has been provided in Section 8.2.16 of Appendix 17 regarding the provision of emergency services, the overall level of assessment has not substantively improved. Further, no additional quantification regarding any potential increase in demand for emergency services has been provided.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments, or the requirements of Clause 7, Appendix 4 of the ToR. The proponent has provided insufficient additional information regarding the capacity of, and demand for, community and health services, and has not provided adequate quantification of potential impacts such as increases in demand.

Proponent Response

The Social Chapter (19B) of this SEIS (v3) and the (SIA - Appendix 14a) have been comprehensively revised and the previous comment and the requirements of Clause 7 of Appendix 4 of the ToR have been addressed. The social baseline contained in section 6 of Appendix 14a has been revised to include capacity and availability of community services where available and relevant. For example, Section 6.7.1. identifies the schools within the local study area, provides enrolment data, and a description of capacity. This is further discussed in the impact identification Section (Section 7 of Appendix 14a). Other examples include a description of emergency services and police within the local study area (Sections 6.9.1 and 6.9.2 of Appendix 14a). Where quantitative data about availability and capacity has not been available, consultative data provides a foundation for assessment of impacts on these services, such as in the case of health services described in Section 6.8 of Appendix 14a. It is worth noting that limited quantitative data is available for the (limited) services available in the local study area.

3.6.5.10 Comment 10

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 5.3, Appendix 17
Submitters Reference (if provided)	30.10		

Details of the Submission

This matter has been partially addressed.

Section 19.5 of Chapter 19B and Section 5 of Appendix 17 has not provided any substantial additional baseline information on community health, safety and wellbeing. Only minor modifications, such as amendments to presentation of law and order data, have been made. As noted in the previous comments on the May 2018 SEIS, the social baseline should include further detail on aspects such as lifestyles and amenity, community values, and health and social-cultural wellbeing, with reference to relevant sections of the EIS, where appropriate.

The impact assessment presented in Section 19.6 of Chapter 19B and Section 8 of Appendix 7 provides additional analysis of wellbeing-related matters such as community values and workforce families. However, the depth of the analysis is limited and – as noted above – there is typically little or no baseline data against which the potential impacts can be benchmarked.

As an indicative example, Section 8.2.2 Appendix 17 states that “The impact of noise, vibration and dust along the railway line will be determined primarily by the distance that townships and rural residences are located from the final railway alignment, along with the quantity of train traffic.” This does not provide a meaningful analysis of the likely impact as it does not clarify the potential volume of train traffic, identify specific receptors, or quantify how the magnitude of impact may differ between receptors. It also does not discuss the consequences e.g. stress, disturbed sleep, impacts to respiratory health etc.

Further, as outlined in Chapter 12 (Air Quality) and Chapter 13 (Noise and Vibration), the Tooloombah Creek Roadhouse/Service Station, which includes two residential dwellings, is the nearest sensitive receptor to the project.

Chapter 13 concluded that Tooloombah Creek Service Station and the two residential dwellings may be impacted by noise during construction and operation of the Project, with the receptors to

experience predicted exceedances in noise criteria for average climatic conditions, even with mitigation measures implemented. However, this is not discussed, or cross-referenced as part of the SIA.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments or the requirements of Clause 7 of Appendix 4 of the ToR. The proponent has not provided sufficiently detailed assessment of potential impacts to the health and social / cultural wellbeing of families and communities. The impact assessment is in turn affected by the lack of relevant baseline data.

Proponent Response

The previous comments and the requirements of Clause 7 of Appendix 4 of the ToR have been addressed through a revised assessment of impacts to health and social / cultural wellbeing, based primarily on information gathered during consultation and review of other technical studies and reports in this SEIS, including air quality, noise and vibration, traffic and transport, and the project description. Summary findings from these studies have been identified and cross referenced in the SIA (see e.g. Section 7.2.6 of Appendix 14a of this SEIS), and quantitative data such as numbers and size of trains and modelled traffic volumes have been provided (see Sections 4.3 and 4.4 of Appendix 14a). Further, impacts related to culturally or socially oriented change processes are also discussed in Section 7.2.6 of Appendix 14a.

3.6.5.11 Comment 11

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19A Chapter 19B
Submitters Reference (if provided)	30.11		

Details of the Submission

This matter has been addressed.

Chapter 19 of the revised SEIS has been separated into two chapters, Chapter 19A – Economic and Chapter 19B – Social Environment. This has notably improved presentation and readability when compared to the May 2018 SEIS.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.12 Comment 12

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19A Chapter 19B Appendix 17
Submitters Reference (if provided)	30.12		

Details of the Submission

This matter has been addressed.

Chapters 19A and 19B, and Appendix 17 have incorporated more up-to-date secondary data where relevant.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.13 Comment 13

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19A
Submitters Reference (if provided)	30.13		

Details of the Submission

The matter has been addressed.

Section 19.5.3 of Chapter 19A has provided a rationale for the determination of major developments relevant to the Project.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.14 Comment 14

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 8.2, Appendix 17
Submitters Reference (if provided)	30.14		

Details of the Submission

The matter has been partially addressed.

Many of the risk rankings provided in Section 10 of Appendix 17 (SIA) are still not clearly evidenced. Indicative examples were provided in the previous comments to the SEIS.

Additional examples include:

- Tables 8-1 and 10-5 in Appendix 17 outline adverse impacts relating to Housing and Accommodation, including ‘changes to existing urban design of Marlborough and / or Ogmore’, which is given an unmitigated risk ranking of ‘medium’. However, the baseline does not provide adequate information to understand and validate the identified impact, as insufficient information is provided on existing lifestyles, amenity and values of the townships.

- Section 8.2.13 of Appendix 17 outlines potential impacts from project traffic and transport. However, no baseline information is provided on existing access and connectivity characteristics of areas that could be potentially impacted by project traffic and transport. As a result, there is no benchmark against which changes to factors such as accessibility or travel times for local communities may be impacted.
- Table 8-2 of Section 8.1 includes a potential positive impact of: 'ability to monitor the health of local water resources on an ongoing basis', under the impact area of Health and Community Wellbeing. However, there is no baseline discussion on the health of local water resources in the social context, and as such, the identified positive social impact is not evidenced.
- Table 10-6 in Section 10 of Appendix 17 outlines impacts relating to Employment, Training and Local Economy. Table 10-6 lists the adverse impact of: 'the project contributing to local skills shortages', with a likelihood rating of 'possible' and a consequence rating of 'minor'. However, the SIA does not include information or discussion on the skills available in the local area, and the capacity of the local area to provide the labour and relevant skills to the Project. As a result, the identified impact is not clearly evidenced. In addition, it is unclear what mitigation action – if any – is proposed to mitigate the impact.
- The assessment of workforce management-related issues is predicated on the assumption that that 'the Project's labour resources will be sourced from within the general local area (Marlborough, Ogmore, St Lawrence, Clairview, Yaamba and The Caves) as a commute workforce' (as stated in Section 19.4.1.2 of Chapter 19B). Section 2.2.1 of Appendix 17 states 'where there are shortages in the number of the operational workforce being drawn from the local area, workers will be sourced from the local region including from Rockhampton, Yeppoon and Emu Park'. The baseline data regarding labour force in Section 5.1 of Appendix 17 is incomplete, however indicates that the total number of people in the general local area participating in the labour force is approximately 281, with around 25 residents employed in the mining industry (excluding Yaamba and The Caves, as no baseline is provided for these communities). This suggests that local communities would only be able to supply a very limited proportion of the overall workforce, and a much greater proportion would need to commute from areas such as Yeppoon or Rockhampton. This has implications for workforce management arrangements when considering fatigue management and accommodation requirements.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments or the requirements of Clause 6 of Appendix 4 of the ToR. Many of the identified impacts and subsequent risk rankings remain poorly evidenced. In particular, some impacts do not clearly link to the baseline due to the limited baseline information provided. This information is required to provide a realistic assessment of potential impacts in the SIA, and in turn to inform the proposed management measures.

Proponent Response

The SIA has been comprehensively revised to address this comment and meet the requirements of clause 6 of Appendix 4 of the ToR. Section 7 of the SIA contained in Appendix 14a of this SEIS, discusses in depth the rationale around each identified impact. For impacts that derive from workforce practices, workforce sourcing scenarios have been developed to support the assessment of impacts (see Section 7.1 for the scenarios). This relates in particular to impacts relating to population (Section 7.2.1), employment (Section 7.2.2), social infrastructure and services (Section 7.2.3) and housing and workforce accommodation (Section 7.2.4). In each of these sections, output

from the scenarios have then been compared with baseline data to arrive at an understanding of likely impacts and their significance. Traffic and transport impacts have been addressed in Section 7.2.3, primarily relating to increased demand on police and emergency services and health and safety impacts of potential incidents. Section 7.3 provides a summary assessment of impacts, drawing on this reasoning.

Section 19B.5 in Chapter 19B of this SEIS provides a summary of the workforce sourcing scenarios and impact assessments.

3.6.5.15 Comment 15

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.9, Chapter 19B Section 11, Appendix 17
Submitters Reference (if provided)	30.15		

Details of the Submission

The matter has been partially addressed.

The revised SEIS contains a more detailed and coherent review of major projects. However, the assessment of potential cumulative impacts has not been substantially amended from the SEIS.

The cumulative impact assessment is also largely duplicated in Chapter 11 in Appendix 17 (SIA), Section 19.9 of Chapter 19A (Economics) and Section 19.9 of Chapter 19B (Social Environment). The cumulative impact assessment across these documents is reported on the 'study area'; however, the study areas employed in the SIA and economic assessment are not consistent, with both assessments using differing geographic levels in defining their study areas. The 'study area' employed in the Cumulative Impact Assessment is also not clearly defined.

As noted in Comment #8, the cumulative impact assessment lacks any quantification of impacts.

Suggested Solutions, Recommendations and Conditions

The revised SEIS does not adequately address the previous comments or the requirement in Appendix 4, Clause 8 of the TOR. The proponent has not provided any quantitative analysis of cumulative impacts such as cumulative workforce demand.

Proponent Response

The Social Chapter (19B) of this SEIS and the (SIA - Appendix 14a) have been comprehensively revised and the previous comment has been addressed. A revised cumulative impact assessment has been undertaken to address this comment. Refer to response provided above in Section 3.6.5.8 (submitters reference 30.8).

3.6.5.16 Comment 16

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.8, Chapter 19B Section 10, Appendix 17
Submitters Reference (if provided)	30.16		

Details of the Submission

This matter has been partially addressed.

Some additional content has been provided in Section 19.10 of Chapter 19B, and Section 10 of Appendix 17. However, the management strategy frameworks and associated action plans still lack specific detail. For example, the Health and Community Wellbeing Strategy, contains aspirational strategies and commitments such as "Working with community and emergency service providers to monitor types of services and demand to ensure any change predicted or caused by the Project's workforce and their families can be managed appropriately", however does not provide tangible actions as to how this will be undertaken.

The action plans included in the revised SEIS are an enhancement, and aid in providing additional detail on specific actions, however these do not always align clearly to the social management strategies.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments and is not consistent with Clause 10 of Appendix 4 of the ToR. The management frameworks provided are still highly generic, and the connections between strategies and actions are not always coherent.

Proponent Response

The SIA (see Appendix 14a of this SEIS) has been comprehensively revised to address this comment and meet the requirements of clause 10 of Appendix 4 of the ToR. Section 8 of Appendix 14a contains action plans aiming to address identified social impacts and opportunities, and has been developed in accordance with the SIA guideline (2018). These are summarised in Section 19B.5 of Chapter 19B. Action plans have been developed addressing community and stakeholder engagement, workforce management, housing and accommodation, local business and industry content, and health and community wellbeing. Actions have been developed to provide increased specificity around what it is that will be done, and when it will be done. For each action plan, objectives as well as performance measures have been provided.

3.6.5.17 Comment 17

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.10, Chapter 19B Section 10, Appendix 17
Submitters Reference (if provided)	30.17		

Details of the Submission

This matter has been partially addressed.

Section 19.10 of Chapter 19B contains some actions which will enhance potential benefits, however as noted in Comment #16, the management strategies and action plans are relatively generic, and lacking in specific detail.

Suggested Solutions, Recommendations and Conditions

While the revised SEIS has partially addressed the previous comments, there is insufficient detail provided to be consistent with Clause 1g) of Appendix 4 of the ToR.

Proponent Response

The SIA (contained in Appendix 14a of this SEIS) has been comprehensively revised to address this comment and meet the requirements of clause 1g of Appendix 4 of the ToR. Section 8 of Appendix 14a and Section 19B.5 of chapter 19B outline the Project's proposed enhancement and mitigation / management measures.

3.6.5.18 Comment 18

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.13, Chapter 19A Section 19.16, Chapter 19B
Submitters Reference (if provided)	30.18		

Details of the Submission

This matter has been addressed.

The TOR cross-reference table has been amended to fix typo.

Suggested Solutions, Recommendations and Conditions

No recommendation - matter closed out.

Proponent Response

Noted. No response required.

3.6.5.19 Comment 19

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.6.10, Chapter 19B Section 8.2.10, Appendix 17
Submitters Reference (if provided)	S30.1		

Details of the Submission

This matter has been partially addressed.

The revised SEIS has amended the peak construction workforce number of 275 people for the years of 2019 and 2020.

However, there remains inconsistency in Section 19.6.10 of Chapter 19B and Chapter 8.2.10 of Appendix 17, which states the project will have a peak construction workforce of 200 people.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comment. There is still inconsistency with reported workforce numbers.

Proponent Response

This comment has been addressed and inconsistencies eliminated. Peak construction workforce in the first construction phase is consistently described as 222.

3.6.5.20 Comment 20

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.2.3.2, Chapter 19B Section 4.1.6.2, Appendix 17
Submitters Reference (if provided)	S30.2		

Details of the Submission

The matter has been partially addressed.

Section 19.2.3.2 of Chapter 19B and Section 4.1.6.2 of Appendix 17 state that 'the core principles outlined in the (SIA) Guidelines were taken to be the core principles for this assessment'.

However, the SIA remains inconsistent with some principles, including:

- Participatory: while a description of engagement activities undertaken for the EIS/SIA has been provided, there is limited evidence of engagement outcomes informing the baseline and impact assessment. As such, there is inadequate validation of SIA findings.
- Rigorous: the lack of participative primary data in the baseline limits understanding of the existing social conditions and trends, which adversely affects the rigour and accuracy of the impact analysis.
- Effective management: the management measures provided in the SIA are still limited in detail. (this is discussed further in Comment #16).

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not addressed the previous comments. The SIA is, overall, not consistent with the core principles of the Coordinator-General's SIA Guideline (March 2018).

Proponent Response

The SIA has been comprehensively revised to address this comment and align with the core principles of the SIA guideline. The revised SIA, contained in Appendix 14a of this SEIS (v3) and Chapter 19B of this SEIS - has been developed in accordance with the SIA guideline (2018). In particular, Section 2 of Appendix 14a describes the approach for generating participatory data (Section 2.1.2), and secondary data (Section 2.1.1), including addressing issues related to data quality, consistency and representativeness. The SIA guideline requirements of participatory and rigorous development of the SIA has thus been addressed. Further, Section 8 of Appendix 14a and Section 19B.5 of chapter 19B provide detailed management strategies for the five core matters required to be addressed in the SIA (Sections 8.2 to 8.6 in Appendix 14a), as well as a monitoring program drawing on a diverse set of data points (Section 8.7 of Appendix 14a).

3.6.5.21 Comment 21

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19B Appendix 17
Submitters Reference (if provided)	S30.3		

Details of the Submission

This matter has been partially addressed.

The social baseline in Section 5.1 of Appendix 17 includes some detail on tourism facilities in the local area and nearby rural centres, such as caravan parks and their size. However, there is limited information and discussion on existing demand for short-term accommodation (including occupancy rates), the typical customers who utilise the short-term accommodation and other tourism facilities in the local area, and any peak periods.

In addition, Section 1.4 of Appendix 17 (SIA) stated that tourism is recognised as an important industry for the Nearby Urban Centres.

Given that the proponent's proposed accommodation strategy is reliant upon the availability of short-term accommodation in the local area, further baseline information is required to adequately identify and assess the potential impacts to the local tourism industry, businesses and the housing market for different stakeholders, and to develop appropriate mitigation actions where relevant.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments on this issue. The proponent has not provided enough information about the potential impacts to the local tourism industry and accommodation market. This information is required to provide a realistic assessment of potential impacts in the SIA, and in turn to inform the proposed management measures.

Proponent Response

The SIA (Appendix 14a of this SEISv3) has been comprehensively revised to address this comment. The revised SIA contained in Appendix 14a has considered the impacts on tourism. Section 6 of Appendix 14a describes the short term accommodation facilities available in the region, the number of rooms available and provides consultation based information about occupancy (Section 6.4.3), as well as information about the amount of and usage of caravan parking spots in Marlborough (Section 6.1.5). The impact assessment has considered impacts to tourism and found it to be negligible, as a) the proposed accommodation solution would involve constructing additional worker accommodation, and b) most of the tourists in the local study area stay in caravans, and the project is not planning to take up caravan space. This is discussed in Section 7.2.5 of Appendix 14a. The Project is not proposing to utilise any tourism facilities in the nearby urban centres (Rockhampton or Yeppoon) and as such will not cause any negative impacts to the tourism industry in these cities.

3.6.5.22 Comment 22

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 8 and 10, Appendix 17, Social Impacts Section 19.6 and 19.10, Chapter 19B
Submitters Reference (if provided)	S30.4		

Details of the Submission

This matter has been partially addressed.

Section 8.2.2 of Appendix 17 provides some discussion of the social dimensions of identified environmental impacts. However, some identified social impacts still require verification with other EIS studies and /or require further analysis to identify the social dimension of the environmental impact.

For example, Table 10-7 in Appendix 17 states that 'people living close to the Project's construction sites may experience reduced quality of living' relating to changes in amenity, and that the likelihood of the impact is rated as 'unlikely' to occur. However, according to Chapter 12 (Air Quality) and Chapter 13 (Noise and Vibration), identified nearby sensitive receptors (namely, Tooloombah Creek Service Station and two residences) will experience dust and noise impacts during both construction and operational phases of the Project, with noise impacts projected to exceed criterion, even with noise management measures in place. Further, Section 7.1 of Appendix 17 states that property owners expressed concern of increased dust and noise, indicating that this is an important issue for property owners and potentially nearby residents. In addition, amenity-related impacts are included throughout Tables 8-1, 10-7 and 10-8 in Appendix 17, but are assigned different likelihood, consequence and risk values. Impacts relating to amenity should be reviewed and revised where relevant, based on baseline information on amenity values (of which limited information is provided), outcomes of other EIS studies and outcomes of community and stakeholder consultation activities.

Cross-references to the relevant EIS Chapters should be provided where relevant in Section 8 of Appendix 17.

Further, some social impacts included in Section 8.1 of Appendix 17 are not deemed social impacts. For example, Table 8-2 of Section 8.1 include a potential positive impact of: 'Ability to monitor the health of local water resources on an ongoing basis'. However, there is limited to no discussion on the health of local water resources in the social context, and as such, the identified positive social impact is not evidenced. It is therefore unclear how the environmental benefit is translated to a social benefit.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the comments on this matter. The proponent has not provided sufficient interpretation of the social dimensions of issues identified in other EIS studies. This information is required to provide a realistic assessment of potential impacts in the SIA, and in turn to inform the proposed management measures.

Proponent Response

The SIA has been comprehensively revised to address this comment, and to provide an interpretation of the social dimensions of environmental impacts. This revision draws on a reviews

of other technical studies in this SEIS (v3), an analysis of the social baseline and additional consultation with stakeholders. As examples, the social baseline provides information on existing ground and surface water use (Section 6.1.3 in Appendix 14a) and fisheries (Section 6.1.4 in Appendix 14a). Further, the assessment of the related impacts has been revised. The social dimension of various environmental and other impacts have been addressed in Section 7.2.6 of Appendix 14a, including amenity impacts, in particular dust, potential impacts on productive land and water from potential groundwater impacts, waterway barriers and surface water site run-off. Further, the revised impact assessment has removed earlier statements that were not deemed to be social impacts and that were not validated by the additional social research undertaken for the revised SIA. Impacts and their pathways are summarised and assessed in Section 7.3 in Appendix 14a and Section 19B.4.2 in Chapter 19B.

In relation to the submitter comments regarding predicted air quality and noise exceedances presented in the earlier SEIS v2, these matters have been revised as part of additional work undertaken to support this SEIS v3. The air quality and noise assessments have been revised to ensure that changes as a result of moving the mine infrastructure, which have come about as part of SEIS v3 to improve environmental outcomes, would not impact adversely on sensitive receptors. The results demonstrate that air quality criteria will not be exceeded at any homestead, or any other sensitive receptor (see Chapter 12 – Air Quality and Greenhouse Gas). With the proposed mitigation measures in place, noise levels are not predicted to exceed the relevant guidelines at any homestead or business. However, during peak operations, (year 12) which will last for a period of one year (year 12) there are predicted to be exceedances of night-time guidelines as the closest four receptors. These are predicted to be able to be brought to within guideline levels via the use of an industry state-of-the-art fleet management system (such as Wenco) to be installed on the mining equipment to restrict the movement of equipment at night. Combining this and closed windows at the affected residences/buildings, it is predicted that noise emissions will be below the required levels.

Due to the potential for exceedances, ongoing noise monitoring and liaison with property owners will be required. It should be noted however, that the worst case scenario represented by year 12 will only occur for the maximum period of one year, and noise levels similar to those modelled for year 3 (which meet all of the noise criteria) are expected for the majority of the life of the Project.

3.6.5.23 Comment 23

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 19.10, Chapter 19B
Submitters Reference (if provided)	S30.5		

Details of the Submission

This matter has been addressed.

The proponent has amended their commitment to review the management strategies in consultation with stakeholders from every five years to annually.

Section 19.10 and Section 19.11 of Chapter 19B and Section 10 and Section 12 of Appendix 17 has included detail for monitoring and reporting the effectiveness of the proposed management measures.

Suggested Solutions, Recommendations and Conditions

No recommendation – matter closed out.

Proponent Response

Noted. No response required.

3.6.5.24 Comment 24

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19B Appendix 14 Appendix 17
Submitters Reference (if provided)	S30.6		

Details of the Submission

This matter has been partially addressed.

The proponent has undertaken additional engagement to inform the revised SEIS, and this has been more clearly documented. However as discussed in Comment #3, this scope of this engagement has been too limited to inform the SIA, and in particular to provide the required participatory primary data.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comment, and is not consistent with Clause 4, Appendix 4 of the ToR. The proponent has not undertaken sufficient stakeholder engagement to inform the SIA. This has in turn affected the adequacy of the baseline analysis, impact assessment and mitigation measures. The ToR specifically states that an 'inclusive and collaborative' engagement process should be undertaken as part of the EIS/SIA process

Proponent Response

The SIA (Appendix 14a of this SEIS) has been comprehensively revised and rewritten to address this comment and meet the requirements of clause 4, Appendix 4 of the ToR. Refer to response in Section 3.6.5.1 (submitters reference 30.1) for a description of the community and stakeholder engagement process that has informed the revised Appendix 14a and chapter 19B.

Additional engagement has been carried out and document in section 5 of the revised SIA (Appendix 14a of this SEIS).

3.6.5.25 Comment 25

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Chapter 19A Chapter 19B Appendix 14 Appendix 17
Submitters Reference (if provided)	S30.7		

Details of the Submission

This matter has been partially addressed.

Section 1.5.1 of Appendix 14 states that the SEP has been targeted for stakeholders and communities based in the study areas identified in the SIA, which include Local (Marlborough, Ogmore and Clairview) and Regional (LRC, RRC and IRC LGAs). However, this is inconsistent with the study area presented in Section 1.4 of Appendix 17 and inconsistent with the economic study area outlined in Section 19.4.2.1 of Chapter 19A.

The study areas defined in the SIA, economic assessment and SEP have not been revised to ensure consistency. If the study areas across the reports are to remain inconsistent, an explanation should be provided.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed the previous comments. As noted in Comment #4 the proponent has presented conflicting social study areas, and there is still significant macro-level inconsistency between the social study area and the economic study area.

Proponent Response

The SIA has been comprehensively revised for this SEIS v3 and the technical report (Appendix 14), the SEIS Chapter describing the social environment (Chapter 19B) and the Stakeholder Engagement Report (Appendix 14b) have been rewritten to address this comment. The local study area has been defined as the state suburbs of Clairview, St Lawrence, Ogmore, Marlborough, Canoona and Kunwarara, and the regional study area as the Central Queensland SA4 and Broadsound – Nebo SA2. This is consistent across the revised SIA (refer to Sections 2.3.1 and 2.3.2 in Appendix 14a), the EIS chapter addressing the social environment (refer to Section 19B.1.4 in Chapter 19B) and the revised stakeholder engagement report (refer to Section 2.2 in Appendix 14b). The regional study area is consistent with that reported in Economic Chapter (Chapter 19A of this SEIS).

3.6.5.26 Comment 26

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 3.1, Appendix 14
Submitters Reference (if provided)	S30.8		

Details of the Submission

This matter has been partially addressed.

Stakeholder feedback has been summarised in Section 7 of Appendix. However as noted in Comment #3, the level of engagement undertaken in support of the SIA is has been limited, and the

outcomes have not been adequately integrated into the baseline analysis, impact assessment and management measures.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed this comment and is not consistent with Clause 4 of Appendix 4 of the ToR.

Proponent Response

The SIA (see Appendix 14a of this SEIS) has been comprehensively revised and additional stakeholder engagement undertaken to address this comment and meet the requirements of clause 4 of Appendix 4 of the ToR. Refer to response to Comment 1 above in Section 3.6.5.1 (submitters reference 30.1) for a fulsome description of the community and stakeholder engagement undertaken and how it has informed the revised SIA.

3.6.5.27 Comment 27

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Section 3.2, Appendix 14
Submitters Reference (if provided)	S30.9		

Details of the Submission

This matter has been partially addressed.

The stakeholder values outlined in Table 3-2, Section 3.2 of Appendix 14 have been identified by the study team based on the potential adverse and beneficial impacts identified in Table 3-1. Stakeholder values should be identified based on feedback from potentially impacted stakeholders rather than on the assumptions of the study team. Any assumed values should be verified through stakeholder engagement.

Suggested Solutions, Recommendations and Conditions

The revised SEIS has not adequately addressed this comment. The assumed stakeholder values have not been verified through stakeholder engagement.

Proponent Response

The SIA (Appendix 14a of this SEIS) has been comprehensively revised to address this comment and to ensure reported stakeholder values are based on and verified through stakeholder engagement. In particular, additional stakeholder interviews have been carried out to ascertain community values present among stakeholders. Section 2 of Appendix 14a describes the methodology followed in the revision of the SIA, including the approach to primary data collection, and Section 5.3 provides details of the additional stakeholder engagement that has been undertaken and reports on the issues raised through these. Community values present in the local study area are comprehensively described in Section 6.2. Section 4.7 in the revised Stakeholder Engagement Report (Appendix 14b) also summarises the themes emerging from the stakeholder engagement.

3.6.5.28 Comment 28

TOR Category or EIS Chapter	Social and Economic	Submitters Reference to EIS Section (if provided)	Appendix 14
Submitters Reference (if provided)	S30.10		

Details of the Submission

This matter has been addressed.

The stakeholder lists in Appendix 14 (Stakeholder Engagement Plan) have been updated.

Suggested Solutions, Recommendations and Conditions

No recommendation - matter closed out.

Proponent Response

Noted. No response required.

3.6.6 Queensland Department of Transport and Main Roads

3.6.6.1 Comment 1

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6, pg 6.1
Submitters Reference (if provided)	Comment 1; Table 1; 10.1		

Details of the Submission

Section 6.6.1 now quotes that the local workforce is expected to reside in Marlborough, Ogmore, St Lawrence, Clairview, Yaamba and The Caves, whilst regional workers are assumed to reside in either Yeppoon, Rockhampton or Mackay as a DiDO workforce. This is noted however, the impacts of these workers on the State-controlled Road (SCR) network have still not been addressed in any detail at any locations other that the proposed Eastern and Western Mine accesses.

Suggested Solutions, Recommendations and Conditions

This is addressed in condition relating to the updated Road Impact Assessment (RIA).

Proponent Response

Noted. No response required.

See response to Comment 6 in Section 3.6.6.9, below.

3.6.6.2 Comment 2

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.4.1, pg 6.3, 6.4
Submitters Reference (if provided)	Comment 2; Table 1; 10.3 and 10.7A		

Details of the Submission

The Road Safety Risk Assessment contained in Chapter 6, Section 6.8.7 and A4a, Section 8 is high level and does not consider several factors. The risk assessment in Figure 6-11 does not address increased risk at State Controlled Roads (SCR) intersections and focusses only on the Bruce Highway. TMR does not agree that providing a Traffic Management Plan sufficiently reduces interruption to traffic flow in a high speed environment, no detail has been provided as to how night time operations will be managed other than a statement that it will be managed under a Construction Management Plan (CMP). Given the haulage task associated with the project construction and operational phases ranges from Brisbane to Mackay, the limited focus on road crash history within 5km of the site is inadequate and should be significantly expanded.

Suggested Solutions, Recommendations and Conditions

Applicant is required to undertake an updated Road Safety Risk assessment as per the RIA condition below.

Proponent Response

Noted. Central Queensland Coal (CQC) commit to undertaking an updated Road Safety Risk Assessment. See response to Comment 6 in Section 3.6.6.9, below.

3.6.6.3 Comment 3

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.6.2 pg 6.11
Submitters Reference (if provided)	Comment 3; Table 1; 10.7B		

Details of the Submission

The proponent has stated that the vehicle numbers are their best estimate at this stage however, it should be noted that no specific details of volumes of steel, concrete, quarry materials and so on have been identified. Given an estimate of number of heavy vehicle movements required for all phases of the project have been provided it is expected that some estimates of the freight volumes associated with the project must have been established to determine the number of heavy vehicle trips necessary to transport the goods. It is also unclear if construction materials for the proposed rail facility have been included or if any of this material will be hauled by road.

Significant additional detail will be required to be provided within the finalised RIA at least six (6) months prior to any construction works commencing.

Suggested Solutions, Recommendations and Conditions

While it is noted that Section 6.6.2 provides some estimates of the number of heavy vehicle movements, it does not provide estimates of volumes of inputs, outputs and wastes and so on for all phases of the project. Given an estimate of number of heavy vehicle movements required for all phases of the project have been provided it is expected that some estimates of the freight volumes associated with the project must have been established to determine the number of heavy vehicle trips necessary to transport the goods.

The condition below relating to a road safety assessment as part of an updated RIA, in particular section b, subsection ii requires the applicant to confirm the total transport task for the project including workforce, inputs and outputs, during the construction and operational phases. This must include a description of the expected volumes, weights and origins/destinations of materials, products, hazardous goods or wastes for each phase of the project.

Proponent Response

Noted. CQC commit to undertaking an updated Road Safety Risk Assessment. See response to Comment 6 in Section 3.6.6.9, below.

3.6.6.4 Comment 4

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.8.1, pg 6.19
Submitters Reference (if provided)	Comment 4; Table 1; 10.10		

Details of the Submission

Noted. No blasting activities that will cause closure of the Bruce Highway are proposed.

Suggested Solutions, Recommendations and Conditions

-

Proponent Response

Noted. No response required.

3.6.6.5 Comment 5

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.8.2, pg 6.20
Submitters Reference (if provided)	Comment 5; Table 1; 10.11		

Details of the Submission

No blasting activities that will cause closure of the Bruce Highway are proposed. A Blast Management Plan (BMP) will need to be provided to address any impacts of flyrock and so on to the Bruce Highway.

Suggested Solutions, Recommendations and Conditions

At least three (3) months prior to commencement of any blasting operations that may impact on the safety or operations of the Bruce Highway, provide a BMP and implement any recommendations as agreed with TMR to manage any potential risks to safety or operational performance of the Bruce Highway as identified in Chapter 6, section 6.7.5.

Proponent Response

Noted.

Procedures to safely manage blasting will be articulated in a Blast Management and Monitoring Plan which will be prepared prior to the commencement of blast activities that may impact upon the safety of users of the Bruce Highway. All potential impacts associated with blasting activities will be assessed. This Plan will be submitted to DTMR for review within a minimum of three months prior to blasting. As these procedures will be developed in conjunction with DTMR, it is not anticipated that there will be operational impacts to vehicles on the Bruce Highway due to blasting activities associated with the Project.

3.6.6.6 Comment 6

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.9.1, pg 6.21
Submitters Reference (if provided)	Comment 6; Table 1: 10.12		

Details of the Submission

A Draft Road Use Management Plan (Draft RMP) has been provided however, this RMP contains a series of commitments to investigate the possibility of provision of workforce shuttle bus services and encourage ride sharing schemes. There does not appear to be a real commitment to do anything more than investigate and encourage these strategies. If the proponent chooses not to provide shuttle bus services and the majority of the workforce choose not to partake in any ride sharing, the impacts of the project related traffic will go largely unmitigated. TMR is seeking a commitment from the proponent to implement strategies such as shuttle bus services rather than generic statements about investigating them.

Suggested Solutions, Recommendations and Conditions

At least six (6) months prior to commencement of project construction, finalise a Road Use Management Plan (RMP) and implement any recommendations as agreed with TMR. The RMP must consider (and include where appropriate) the following:

a.) Public safety at worksites;

b.) Obstruction to road users;

c.) Workforce management strategies to reduce traffic generation including but not necessarily limited to:

i.) Provision of a shuttle service for workers to reduce private vehicle usage and overall traffic generation;

ii.) Provision of a ride sharing scheme to increase worker vehicle occupancy and decrease overall traffic generation;

iii.) Scheduling shift times and heavy vehicle movements such that project traffic does not coincide with network peak periods.

d.) Management of driver behaviour to ensure that project traffic is driving in a safe manner;

e.) Driver fatigue management strategies;

f.) Use of vehicle location tracking systems that allow monitoring of driver behaviour;

g.) Providing a system of identifying project related vehicles and provision of a free call number for community members and other road users to contact if they have concerns, queries or complaints about driver behaviour;

h.) Defining responsibilities and procedures for implementation, monitoring and RMP strategy amendment;

i.) Management strategies to limit the impacts of over size and over mass loads through the National Heavy Vehicle Regulator (NHVR);

j.) Management strategies for the transportation of hazardous materials such as fuels and chemicals; and

k.) Ongoing monitoring for road safety impacts from project activities (for example, dust, debris/construction materials on roads and site lighting and so on).

2. The documentation required for the RIA and RMP must consider the entire haulage route for construction and operational phases of the project rather than focussing only on the Bruce Highway or specifically in the vicinity of the proposed new accesses.

Proponent Response

CQC commit to finalising the draft RMP, contained in Appendix 4a of this SEIS, in conjunction with relevant State and local road authorities, at least six months prior to commencement of construction activities. The RMP will consider (and include where appropriate) the following:

a. Public safety at worksites.
b. Obstruction to road users.

c. Workforce management strategies to reduce traffic generation including but not necessarily limited to:
   i. Provision of a shuttle service for workers to reduce private vehicle usage and overall traffic generation
   ii. Provision of a ride sharing scheme to increase worker vehicle occupancy and decrease overall traffic generation
   iii. Scheduling shift times and heavy vehicle movements such that project traffic does not coincide with network peak periods.
d. Management of driver behaviour to ensure that project traffic is driving in a safe manner.
e. Driver fatigue management strategies.
f. Use of vehicle location tracking systems that allow monitoring of driver behaviour.
g. Providing a system of identifying project related vehicles and provision of a free call number for community members and other road users to contact if they have concerns, queries or complaints about driver behaviour.
h. Defining responsibilities and procedures for implementation, monitoring and RMP strategy amendment.
i. Management strategies to limit the impacts of over size and over mass loads through the NHVR.
j. Management strategies for the transportation of hazardous materials such as fuels and chemicals.
k. Ongoing monitoring for road safety impacts from project activities (for example, dust, debris/construction materials on roads and site lighting and so on).

The RMP will consider the entire haulage route for construction and operational phases of the project.

The commitment to update the RMP has been reflected in Chapter 6 – Traffic and Transport.

3.6.6.7 Comment 7

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.9.1, pg 6.21
Submitters Reference (if provided)	Comment 7; Table 1; 10.13		

Details of the Submission

The Road Safety Risk Assessment contained in Chapter 6 and A4a is quite high level. Given the haulage task associated with the project construction and operational phases ranges from Brisbane to Mackay, the limited focus on road safety within 5km of the site is inadequate and should be significantly expanded.

Suggested Solutions, Recommendations and Conditions

Part b of RIA condition below requires the applicant to undertake a Road Safety Assessment.

Proponent Response

Noted. See response to Comment 9 in Section 3.6.6.9, below.

3.6.6.8 Comment 8

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Sect 6.12, pg 6.27
Submitters Reference (if provided)	Comment 8; Table 1; 10.17		

Details of the Submission

Chapter 6, Section 6.8.3 and A4a, Section 5.4 identify that the Bruce Highway link 150m north of Terra Nova Drive will exceed the theoretical capacity in 2028 and 2030 as a result of project related traffic but suggests that this is satisfactory on the basis that there are some overtaking lanes on this section of the highway and some potential mitigation measures are being considered in section 5.5 of A4a. This is a very simplistic assumption and is not supported by any traffic data or calculations. The mere existence of overtaking lanes on some sections of the Bruce Highway does not necessarily mean that this section of the link will not be operating above capacity. Furthermore, any overtaking lanes are unlikely to be over the entire length of the link which is overcapacity and as such it cannot be assumed that this section of the link will operate satisfactorily.

Suggested Solutions, Recommendations and Conditions

As part of the RIA condition below, the applicant will be required to identify appropriate mitigation measures required to manage project traffic on the state- controlled road.

Proponent Response

Noted. See response to Comment 9 in Section 3.6.6.9, below.

3.6.6.9 Comment 9

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Chapter 6, Section 6.6.1
Submitters Reference (if provided)	Comment 9; Table 1; 10.49		

Details of the Submission

The local workforce is expected to reside in Marlborough, Ogmore, St Lawrence, Clairview, Yaamba and The Caves, whilst regional workers are assumed to reside in either Yeppoon, Rockhampton or Mackay as a Drive-in/Drive- out (DiDo) workforce. This is noted however, the impacts of these workers on the State- controlled Road (SCR) network have still not been addressed in any detail at any locations other that the proposed Eastern and Western Mine accesses. Fitzroy District does not agree that the project related traffic impacts on SCR network intersections has been fully addressed in either Chapter 6 or A4a. Many of the localities identified as sources of the construction and operational workforce such as The Caves, Yaamba, Marlborough and Ogmore (within the Fitzroy District) only have one way in and out of town linking to the Bruce Highway. As such, the movement of these workers will not be limited to through movements as stated within the EIS documents.

It is also asserted that the Road Link Assessment captures any project impacts on the SCR intersections, which Fitzroy District also disagree with as not all movements at the impacted intersections will be through movements. The proposal to investigate the possibility of provision of workforce shuttle bus services and encouraging ride sharing schemes are appreciated however,

there does not appear to be a commitment to do anything more than investigate and encourage these strategies. If the proponent chooses not to provide shuttle bus services and the majority of the workforce choose not to partake in any ride sharing, the impacts of the project related traffic will go largely unmitigated. TMR should be seeking a commitment from the proponent to implement strategies such as shuttle bus services rather than generic statements about investigating them. Further assessment of turning movements associated with the transport of these workers will need to be provided in the final RIA.

Suggested Solutions, Recommendations and Conditions

At least six (6) months prior to commencement of project construction, submit a final RIA to DTMR for review, approval and implementation of any identified impact mitigation measures as agreed with DTMR, which includes the following as per DTMR's Guide to Traffic Impact Assessment:

a. A final Traffic Impact Assessment (TIA) including a final Pavement Impact Assessment (PIA) that considers cumulative impacts of all project related traffic on the State-controlled road (SCR) network. This final TIA/PIA must also identify any mitigation measures required to adequately manage all project related traffic impacts;

b. A road safety assessment, which must include but will not necessarily be limited to the following:

i.) Undertaking a road safety assessment of the current conditions of the SCR network and identifying potential mitigation measures as necessary to improve road safety;
ii.) Confirming the total transport task for the project including workforce, inputs and outputs, during the construction and operational phases. This must include a description of the expected volumes, weights and origins/destinations of materials, products, hazardous goods or wastes for each phase of the project;
iii.) Existing pavement conditions and defects which may lead to safety issues;
iv.) Existing intersection performance from a safety perspective;
v.) Existing SCR infrastructure and impacts of project related traffic.
3. The documentation required for the RIA and RMP must consider the entire haulage route for construction and operational phases of the project rather than focussing only on the Bruce Highway or specifically in the vicinity of the proposed new accesses.
4. Haulage of any coal on the State-controlled Road (SCR) network is not supported.
5. Closure of the Bruce Highway is not permitted to occur at any stage during the construction or operational phases of the project to facilitate any mine associated activities (including blasting).
6. At least three (3) months prior to commencement of project construction, provide a CMP and implement any recommendations as agreed with TMR to manage any construction related Road Safety Risks as identified in A4a, Section 8.

Proponent Response

CQC commit to finalising a RIA in consultation with DTMR, which includes a TIA the following as per DTMR's Guide to TIA and a Road Safety Assessment in accordance with DTMR's Guide to Traffic Impact Assessment, and will include:

- A final TIA including a final PIA that considers cumulative impacts of all project related traffic on the State-controlled road (SCR) network. The final TIA/PIA will also identify any mitigation measures required to adequately manage all project related traffic impacts
- A road safety assessment, which must include but will not necessarily be limited to the following:
  - undertaking a road safety assessment of the current conditions of the SCR network and identifying potential mitigation measures as necessary to improve road safety.

  - confirming the total transport task for the project including workforce, inputs and outputs, during the construction and operational phases. This must include a description of the expected volumes, weights and origins/destinations of materials, products, hazardous goods or wastes for each phase of the project.
  - existing pavement conditions and defects which may lead to safety issues.
  - existing intersection performance from a safety perspective.
  - existing SCR infrastructure and impacts of project related traffic.
- The documentation will consider the entire haulage route for construction and operational phases of the project.
- No haulage of any coal on any SCR network is proposed as part of the Project as all coal will be transported by rail to the DBCT.
- Following discussions with DTMR since the release of the EIS, CQC has agreed to avoid undertaking blasting activities that will require the closure of the Bruce Highway. For clarity, CQC is not proposing any Project related activity that will require the closure of the Bruce Highway. CQC will continue to work with DTMR to establish appropriate blasting programs that facilitate the mining of coal in proximity of the Bruce Highway and avoid the need for road closures during blast periods.
- At least three months prior to commencement of project construction, CQC will provide a CMP and implement any recommendations as agreed with TMR to manage any construction related Road Safety Risks as identified in Section 8 of SEIS v3 Appendix A4 – Road Impact Assessment.
- The aforementioned commitments have been outlined in Chapter 6 – Traffic and Transport.

3.6.6.10 Comment 10

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Geotechnical Assessment- EIS Appendix 4b - July 2017
Submitters Reference (if provided)	Comment 10; Table 1; 10.55		

Details of the Submission

CQC has responded to our previous geotechnical comment, reference No. 10.55, that they are committed to undertaking additional geotechnical investigation within the first 6 months after the commencement of operations, and further ongoing geotechnical assessments of the mining pit as it develops and approaches the 500 m blasting buffer zone.

We have no objections for CQC undertaking the investigation within the first 6 months after the commencement of operations and with no pit excavation within the buffer zone. However, as commented before (reference No. 10.55), the investigation should include sufficient number of geotechnical boreholes and testing to make a detailed geotechnical assessment to ensure the safety of the road users and the road assets.

Suggested Solutions, Recommendations and Conditions

The proponent is to provide bi-annual geotechnical assessments, starting six months from the commencement of project operations to ensure that there are no impacts of project blasting on the state-controlled road. In particular the geotechnical assessment must include the following:

- Prepared by an experienced RPEQ geotechnical Engineer from a GE3 level geotechnical consultant.
- Detailed geological and geotechnical model(s), identifying all potential failure mechanisms.
- Justification for the engineering properties used for each geological layer identified.
- Detailed stability analyses, including kinematic stability checks.
- Impact of the excavations on Bruce Highway.
- Details on instrumentation (types, locations & the monitoring review procedure) and on the geological mapping procedure during the excavation of pits in order to validate the geological model(s) assumed in the stability assessment.

Proponent Response

CQC commit to undertaking bi-annual geotechnical assessments, commencing from six months prior to Project operations, to ensure that there are no impacts of project blasting on the Bruce Highway. The geotechnical assessment will include the following:

- Prepared by an experienced RPEQ geotechnical Engineer from a GE3 level geotechnical consultant.
- Detailed geological and geotechnical model(s), identifying all potential failure mechanisms.
- Justification for the engineering properties used for each geological layer identified.
- Detailed stability analyses, including kinematic stability checks.
- Impact of the excavations on Bruce Highway.
- Details on instrumentation (types, locations & the monitoring review procedure) and on the geological mapping procedure during the excavation of pits in order to validate the geological model(s) assumed in the stability assessment. The aforementioned commitments have been outlined in Chapter 6 – Traffic and Transport.

3.6.6.11 Comment 11

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Appendix 12 Section 12.9
Submitters Reference (if provided)	Comment 11; Table 1; 10.51-10.54		

Details of the Submission

To minimise coal dust emissions during rail transport of project coal to port, the applicant has identified a number of mitigation measures to manage coal dust. As such, a condition should be included to ensure the applicant applies the relevant mitigation measures identified in table 12-18 to manage coal dust applicable to project haulage.

Suggested Solutions, Recommendations and Conditions

Prepare and implement a Coal Dust Management Plan (CDMP) which identifies control measures to effectively mitigate dust emissions from loaded and unloaded coal haulage trains (consistent with the measures identified in table 12-18 in Chapter 12 of the SEIS) when transporting coal via Aurizon's rail systems in accordance with the aims, objectives and mitigation measures specified in the Aurizon Coal Dust Management Plan (2010). The CDMP is required to be in place prior to the haulage of project coal.

Proponent Response

Prior to the haulage of project coal, CQC will prepare and implement a Project specific Coal Dust Management Plan which identifies control measures to effectively mitigate dust emissions from loaded and unloaded coal haulage trains consistent with the measures identified in Section 12.7.3 of Chapter 12 – Air Quality and Greenhouse Gas.

This commitment to has been reflected in Chapter 12 – Air Quality and Greenhouse Gas.

3.6.6.12 Comment 12

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	
Submitters Reference (if provided)	Comment 12; Table 1; General Conditions		

Details of the Submission

The following general conditions should be applied to the project to ensure infrastructure relevant to TMR's jurisdiction is not negatively impacted.

Suggested Solutions, Recommendations and Conditions

At least six (6) months prior to commencement of project construction, submit applications under sections 62 and 33 of the *Transport Infrastructure Act 1994* for approval in relation to the proposed new eastern and western site accesses to the SCR network.

Proponent Response

Noted.

CQC commits submitting applications under sections 62 and 33 of the *Transport Infrastructure Act 1994* for approval in relation to the proposed new eastern and western site accesses to the SCR network, at least six months prior to commencement of construction.

3.6.6.13 Comment 13

TOR Category or EIS Chapter	Traffic and Transport	Submitters Reference to EIS Section (if provided)	Chapter 6, Section 6.8.5 and A4a, Sections 4.3 and 7
Submitters Reference (if provided)	Comment 1; Table 2		

Details of the Submission

Table 4.5 of A4a identifies a significant number of heavy vehicle trips to/from the Local areas, which will presumably be utilising SCR's other than the Bruce Highway. Chapter 6, Section 6.8.5 and A4a, Sections 4.3 and 7 have only assessed project related pavement impacts on the Bruce Highway and have not assessed any impacts on other SCR's in the Local area.

Suggested Solutions, Recommendations and Conditions

The final RIA will need to address pavement impact across the entire affected SCR network. This has been reflected in a condition above requiring the applicant to provide an updated RIA.

Proponent Response

Noted. See response to Comment 9 in Section 3.6.6.9, above.